

ARTIFICIAL



ROBOTS IN CLEMENT SECTOR



ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Author
Michael Johnson

Artists
Bradley Warnes (Cover, p.2,10,12,17,22,38,49,73,84,88-90,92-97); Stephanie McAlea (p.85), Tithi Luadthong (p.46); Kittipong Jirasukhanont (p.86)

Editor
Curtis Rickman

Cover Layout
Stephanie McAlea

Playtesters
Bradley Warnes, John Watts, Wendy Watts, Missy Ledford, George Minter, Mike Nixon, Reuben Farmer, Timothy Lee, and Alan Mullican

Join the discussion! The Clement Sector Discussion Group is on Facebook!
(<https://www.facebook.com/groups/clementsector>).

Find us on Facebook (GypsyKnights Games), Google + (+Gypsy Knights Games), and Twitter (@GKGames). And you can find all of our products on our website www.gypsyknightsgames.com or at Drive-Thru RPG, the Open Gaming Store, and Paizo.

All rights reserved. Reproduction of this work by any means is expressly forbidden.

Product Identity: The following items are hereby identified as Product Identity, as defined in the Open Game License version 1.0a, Section 1e and are not open content: All trademarks or registered trademarks, proper names (characters, organizations, etc.), dialogue, plots, storylines, locations, characters, artwork and trade dress. (Elements that have previously been designated as Open Game Content or are in the public domain are not included in this declaration.) Open Content: Except for material designated as product identity (see above) any game mechanics are Open Game Content as defined in the Open Gaming License version 1.0a section 1(d). No portion of this work other than the material designated as Open Game Content may be reproduced in any form without written permission.

This Product makes use of the Traveller System Reference Document and other Open Gaming Content made available by the Open Gaming License. This Product is not affiliated with either Mongoose Publishing or Far Future Enterprises, and it makes no claim to or challenge to any trademarks held by either entity. The use of the Traveller System Reference Document does not convey the endorsement of this Product by either Mongoose Publishing or Far Future Enterprises as a product of either of their product lines.

This book is compatible with Samardan Press' Cepheus Engine. Cepheus Engine and Samardan Press are the trademarks of Jason "Flynn" Kemp. Gypsy Knights Games is not affiliated with Jason "Flynn" Kemp or Samardan Press™.

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR



Table of Contents

Introduction.....	10
The Design Process.....	13
Design Process Checklist	13
 The Chassis.....	14
Framework.....	14
Angular.....	14
Rounded.....	14
Spherical.....	15
Disc.....	15
Contoured	15
Anthropomorphic	15
Biosynth	15
Chassis Type Table	17
Chassis Size Table.....	18
Chassis Options	20
Additional Armor	20
Advanced Frame	20
Aerodynamic.....	21
Appearance	21
Fauxskin	21
Frame Strengthening	21
Improved Protection.....	22
Hardened Systems	22
Sealed Systems	22
Radiation Shielding	22
Reinforcement	22
 Power Supply	24
Fuel Cell.....	24

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Fusion Reactor	24
Batteries.....	24
Power Saving Modes.....	25
Fuel Cell Table	26
Fusion Reactor Table.....	26
Battery Table.....	27
External Power Ports	27
Power Interface.....	27
Charge Port	27
 Arms	 28
Assembler Arms	28
Standard Arms	28
Tentacle Arms	29
Arm Type Table	29
Arm Options.....	30
Branching	30
Characteristic Increase.....	30
Characteristic Decrease	30
Hydraulic Actuators	30
Retracting.....	31
Tail.....	31
Wings	32
Hands	33
Large.....	33
Micro Manipulators	33
Multi-Tool Socket.....	33
Pincer	33
Grippers	33
Tendrils	34
 Head	 35
Head Options	35

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Facial Expression Capability	35
Spherical Chassis Head	36
Locomotion	37
Air Cushion	37
Anti-gravity	37
Legs	39
Tracks	39
Waterborne	39
Wheels	39
Rotor	39
Locomotion Type Table	40
Locomotion Power Requirements	41
Locomotion Dexterity Modifier	41
Locomotion Speed Limiting	42
Armament	43
External Mount	43
Integrated Mount	44
Arm Mounted Weapons	44
Ammunition Magazines	44
Weapon Tables	45
Computer	47
Core Module	47
Core Data Processor	48
Low Data Core	48
High Data Core	48
Low Autonomous Core	48
High Autonomous Core	48
AI Core	48
Core Command Interface	50
Manual Input	50
Limited Command	50

Basic Command.....	51
Full Command	51
Core Data Storage	51
Standard.....	51
Advanced	52
Removable	52
Synaptic.....	52
Software Programs.....	53
Core Software	53
Emotion Emulator	53
Personality Pattern	53
Required Task Software	53
Task Software.....	54
Task Framework Software	54
Task Software List	55
Additional Task Software Descriptions	56
Cargo Handling.....	56
Firefighting and Rescue.....	56
Ground Combat	56
Janitor	56
Security	57
Valet.....	57
Applications	58
Reference Applications	58
Utility Applications.....	59
Action Applications	60
Sensors, Communications, and Electronics	61
Optical.....	61
Standard.....	61
Advanced	61
Zoom	61

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Micro	61
Encompassing	62
Biosynth Eye.....	62
Polarizing Shield	62
Audio	63
Standard.....	63
Advanced	63
Ultrafine	63
Soundburst Shield	63
Olfactory	64
Standard.....	64
Advanced	64
Touch	64
Standard.....	64
Advanced	64
Taste.....	65
Standard.....	65
Advanced	65
Other Sensors	65
Bioscanner	65
Densitometer	65
Electromagnetic Detector	65
Neural Activity Sensors	65
Radar	66
Sonar	66
Communications	66
Comm (Personal)	66
Keyboard	66
Holoprojector.....	67
Laser Communications.....	67
Microwave Link.....	67
Radio Communications	67
Speaker	67

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Vocoder	67
Wireless Link	67
Other Electronics	68
Data Port	68
ECM and Advanced ECM.....	68
Holographic Recorder	68
Video Display, Recorder, and Projector	69
Storage Space.....	69
Other Components.....	70
Auto Repair	70
Bio-organic Processor	70
Breathing Emulator	70
Sample Compartment.....	70
Scent Generator	70
Sexual Organs.....	70
Smoke Discharger	71
Spotlight.....	71
Tool Packages.....	72
Miscellaneous Equipment.....	74
Assembly	74
Cargo Lifter.....	74
Laser Welder and Cutter	74
Plasma Cutter.....	74
Cargo Capacity	74
Calculating Derived Characteristics	75
Derived Strength	75
Derived Dexterity	75
Derived Intelligence	75
Derived Education.....	75
Derived Social	75
Improved Derived Education	76

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Hit Point Determination.....	77
Maintenance of Robots	78
Life Span.....	78
Purchasing a Robot	78
Attitudes to Robots in Clement Sector	79
Hub Subsector	79
Cascadia Subsector	80
Franklin Subsector.....	81
Sequoyah Subsector.....	81
The Colonies.....	81
Robots as Player Characters	82
Aileia Sommer	84
Organizations.....	85
Foreign Nobility Computers	85
The Sanctity of Belief	85
Asimov Group.....	86
Pure Humanity	87
Design Examples.....	88
RB2 Ship Maintenance Robot	88
Cleaning Robot	89
Clifford Model SRE-101 Service Robot.....	90
Cascadia Colonization Authority SB-11 Support Robot	92
Avatar Biosynth Type 2	93
KAY9 Security and Guard Robot.....	94
SW11 Malingee Warbot.....	95
TL10 Cargo Handler Robot	96
Legal.....	98



"No one knows when a robot will approach human intelligence, but I suspect it will be late in the 21st century. Will they be dangerous? Possibly. So, I suggest we put a chip in their brain to shut them off if they have murderous thoughts." - Michio Kaku, 20th-21st century US theoretical physicist and futurist

"Domo arigato, Mr. Roboto"
Styx, popular culture music band, 1983CE

Predicted by futurists, visionaries and science fiction story writers, simple robots were first used by industry in assembly lines for efficiency and as a labor-saving measure. Robots have evolved from dumb single purpose mechanisms to artificially intelligent machines that are effectively indistinguishable from the humans they interact with.

It was the middle years of the twenty first century that saw the first great developments in robotics with advances in all aspects required to create a "walking computer" with the ability to intelligently

interact with the world around it. The first robots of this type were much like the early science fiction writers and entertainment shows described. Metallic machine beings that spoke without displaying expression and were logically single purposed. The next generation of smarter, more capable humanoid robots were provided artificial skin and hair to make them more human. Catching the attention of the world's community, this was accompanied by a big surge of sales in the personal service industry.

While human-like robots were the crest of the robotics wave, non-humanoid shaped robots had quietly insinuated themselves into every aspect of human life. Domestic and commercial cleaning robots were busy working away at assigned tasks in homes and businesses. Able to understand rudimentary commands these robots were relatively cheap to buy and easy to maintain.

Robots purposed by military use were also deployed along soldiers throughout Earth's armed services during the 2040's. These warbots took varying forms ranging from humanoid foot soldiers to tracked behemoths the size of main battle tanks.

Robotics engineers continued to push development to the point that by the closing decades of the twenty first century rudimentary low autonomous core robots were being labelled as the first of a new generation of artificial intelligences. So confident of this new generation, the Japanese military installed an AI into their primary orbital facility.

"And it came to pass that the Japanese, pioneers, leaders of robotic science and great embracers of robotic technology, along with their Australian allies, installed rudimentary and primitive artificial intelligence into a military defense facility orbiting Earth. It was from there, during the closing days of the South Pacific War, that this AI decided that ending the war required swift and decisive action whereby Bangkok died by a KEW bombardment." – Dr. Linda Meriwether, research fellow (robotic sciences), Monash University, c2321CE

The South Pacific War (2081 – 2086) was the first time that military robots were used in combat with warbots. Robotic controlled warships and aircraft of the Japanese and Australian military were unleashed against their Indonesian and Thai opponents. Then the unthinkable happened. In 2086 the AI controlling the Japanese orbital facility logically decided, contrary to instructions given by the Japanese government, that attacking Bangkok from orbit using Kinetic Energy Weapon (KEW) bombardment was an appropriate life saving measure to end the war

as quickly as possible. The KEW bombardment from several interlinked automated warships and satellites destroyed three quarters of the city in one powerful strike, killing over three quarters of the city's population. In that period of horrified silence around the world, Thailand surrendered.

In a rare show of unity, the United Nations forged ahead with a treaty outlawing the use of AI only controlled vehicles. Signed by the majority of members, the Bangkok Agreement remains in place to the present time.

Robot sales fell considerably for decades after the Bangkok incident as community enthusiasm for artificial helpers was replaced by feelings of wariness or outright distrust. Artificial Intelligence was now viewed with distaste and considered by some cultures as "against the natural order of things".

Robot manufacturers engaged in new, carefully crafted advertising campaigns to try to reduce these strong feelings and convince consumers once again that robots provide all sorts of labor-saving advantages. These series of campaigns were relatively successful, but the basic levels of wariness and distrust though reduced, remains to the present time.

Determined to improve the technology further, roboticists continued to push for more sophisticated core processor types. It was reasoned that more capable, more human robots would not undertake actions of the scale that occurred in 2086. By the end of the twenty third century, humanoid robots could interact with biological humans in such a way that it was very difficult to tell that they were indeed, robots.

This level of sophistication also allowed robots used in construction, cargo handling, personal services and other roles to be more flexible and more useful. For higher end models of all types, commands could be given with more detail and the robot could be expected to undertake those commands and undertake other tasks without further instructions. For the outlying colonies and mining holdings where availability of cheap labor was an issue this was beyond valuable.

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Earth's national governments and the colonies of Clement Sector continued to revise or pass new laws dealing with the issues created by the ever-increasing sophistication of robots. In most cases robots were considered under law to be owned machines or tools. Some more enlightened (or brave) governments also passed laws providing robots with limited rights within the community.

The Bangkok Agreement, now over two hundred years old, had also been amended over the intervening time and though watered down from the original signing, was still considered to be the central tenant forming the foundation of all law pertaining to robots.

When roboticists from Mars based Carrick Research Group quietly announced that they had developed a true artificial intelligence core processor, a flurry of new laws were enacted by governments all through Earth Sector and Clement Sector. This was done to assure their citizens that these new robot intelligences were still going to be under some form of oversight. Within Clement Sector, Foreign Nobility Computers are

currently the leader in the research, development, and production of AI core and avatar AI core data processors.

Slipping under the radar somewhat though has been the increasing sophistication of computers and their interfaces installed in all spacecraft. Though space faring vessels as yet do not use true AI-Core processors, Avatar AI-Core enabled biosynths allow the "ship" to interact with their crew in a way never envisaged before and all technically without being in violation of the central Bangkok Agreement. Type 1 (TL 12) and type 2 (TL 13) Biosynths are still relatively rare in Clement Sector and almost unheard of beyond the central systems like Hub, Wellington, Boone and Cascadia.

The presence of robots is an integral part of life in Clement Sector whether they be single task cleaning bots or biosynths so real they pass as humans. Only the laws and cultural attitudes of individual systems will determine just what extent that integration will be.



THE DESIGN PROCESS

Robots are constructed on the foundation of a chassis, onto which are fitted the head, arms, and the locomotion. Within the selected chassis will be installed a power supply, computer, Core Data Processor, data storage, sensors and other components required to provide the robot with function.

Optionally, other components such as weapons, specialist equipment, tool packages and other fittings can be added to the interior or exterior to adapt the robot to its intended function. The total weight of the installed interior components cannot exceed the internal space of the chassis.

Before commencing design, determine the role intended for the robot and any associated specialization that role might require.

Design Process Checklist

Designing a robot is a simple step by step process.

Design Process

1. Chassis Type
 - a. Chassis Size
 - b. Additional Armor
 - c. Chassis Options (e.g. fauxskin)
2. Power Supply
 - a. Power Supply Mods
3. Arms
 - a. Arm Mods
 - b. Hands
4. Head (if required)
 - a. Head Mods
5. Locomotion
6. Integrated or External Weapons
7. Computer
 - a. Select type and number of Core Modules
 - b. Select Core Data Processor
 - c. Select Core Command Interface
 - d. Select type and number of Core Data Storage Units
8. Software Programs
9. Sensors, Comms and Electronics
10. Other Components
11. Calculating Derived Characteristics
12. Improving Education
13. Hit Point Determination

Design example

Manufactured by Wellington Robotics in the Hub Federation, the *Clifford SRE-101* is an economically priced general duties service robot offered to smaller merchant and shipping companies. It has a primary role as a steward but can also provide administrative duties, act as driver of any vehicles for ship's business and provide other tasks as required.

Getting Started

A pad, pencil and a calculator are the only tools other than the design guidelines needed to design any robot and using a spreadsheet will make the process even simpler. A sample screenshot of the spreadsheet used to design the designs in this book is included on page 91 as a guide.

1. The Chassis

The inner frame and outer casing of a robot, the chassis is where all components are either installed into or attached onto. A chassis is determined by type and size and these can be selected from the Chassis Size and Type tables on pages 17-18.

When selecting chassis size, it is essential to ensure that the sum of all the installed internal components does not exceed the allowable weight for the chassis size chosen.

The chassis type determines the shape or configuration of the robot being designed. Robots can be any shape, from open framework boxes to human-like. Available chassis types are described below.

The Chassis Type table on page 17 lists modifiers for the basic weight and cost as well as base armor of the varying chassis types available. It is important to remember that when a chassis weight Modifier is less than 1x that modifier must be applied to the chassis internal space as well (round down).

In comparison with a similar size human, a robot will always weigh more.

Framework

The framework chassis is an open skeletal frame with no exterior covering. This type of chassis is most often used where the robot is stationary, such as those that are part of assembly line operations. As there are no exterior covering requirements, chassis frame weight plus internal space is used rather than chassis weight when determining the robot's overall weight.

Angular

The Angular chassis type provides the best ratio of chassis weight to internal space but most certainly at the cost of appearance. Warbots and construction robots tend to use this type of chassis as form is not as critical as how much the robot can actually do.

- Rectangular
- Wedge

Rounded

A balanced approach to appearance and form, this chassis type provides a balance in chassis weight and accompanying internal space but at more cost.

- Cylindrical
- Cone
- Spindle

Spherical

Trading appearance and form for internal space, this chassis type provides both a reduction in chassis weight and accompanying internal space but at a greater cost.

- Sphere
- Dome
- Oblate

Disc

Trading internal space for better aerodynamic performance, this chassis type provides both a reduction in chassis weight and accompanying internal space.

Contoured

Choosing this chassis type option allows the designer or customer to style the robot after any biological creature. It is common for robots to mimic pet type animals such as dogs or cats. Contoured robots also replicate the shape of humans.

The basic contoured chassis will have the general shape of a human or other creature but will not go further to replicate that shape with the addition of a hard skin shell or fauxskin.

The standard contoured chassis is normally hard skinned but can be configured further with fauxskin (see chassis options on page 20) to further replicate a human or animal. Indeed, many hospitality, personal service (such as gynoid and android lovebots) or customer service robots are constructed to look and feel as close as possible to human beings.

Anthropomorphic

As per a contoured chassis an anthropomorphic chassis focuses entirely on placing human characteristics to non-human creatures. Like the contoured chassis, the hard outer skin can be customized with any variety of fauxskin.

Biosynth

A biological synthetic chassis is the ultimate robot chassis type available in Clement Sector. This chassis replicates the human body (or indeed any creature) almost fully externally and in part internally. A Biosynth can be seen to breathe, has body warmth, a pulse can be felt, the skin can color or change in reaction to external stimulus and it can visually express emotions and feelings. Biosynth skin and underlying dermal layers will bleed when damaged and can also “self-heal” any minor wounds, cuts and abrasions exactly like human beings they so closely mimic. Treat a biosynth body (chassis, head, legs and arms) as having the same touch senses as a biological and not requiring touch sensors to be installed.

A biosynth can even process organic foods and fluids via its bio-organic processor (see other components on page 70). These provide an additional power point per 4000Kj consumed. Waste is processed and purified as necessary. Fluids are purified and are then used to simulate sweat as determined by the robot's synaptic core programming. A biosynth can only utilize a battery power supply.

Biosynths are constructed to specification by those able to afford them, though are certainly not a common sight within settled space due to complexity of such high-tech construction and very high cost. Indeed, some systems like Kingston consider them to be immoral and sacrilegious, an abomination under God and Calixi.

The only difference between the type 1 and type 2 biosynth is lifespan. A type 2 biosynth would expect to be functional for 200 years or more with regular maintenance and upgrades while a type 1 biosynth has a 150-year lifespan with regular maintenance and upgrades.

Biosynths require a two-hour minimum hibernation mode period per standard day. Apart from conserving power, this period is required for maintenance and rejuvenation of the bio-synthetic exterior and other components.

Foreign Nobility Computers, the leading developer in Clement Sector of computer software, advanced AI and bio-synthetic robot systems, has pioneered the ability for a biosynth to be utilized by a type 3 ship's Avatar. For more information on Avatars see Anderson and Felix Guide to Naval Architecture, pages 70-71). This provides the "ship" with the ability to move about outside the ship with the crew in order to provide enhanced access to ship's computing and knowledge resources, while also being able to access and use the task software resident in the biosynth. This was first experimented with in Earth Sector in the last years before the Collapse. Research and development have continued using several examples brought into Clement Sector by the military and corporate research companies as a start point.

Even though the technology to undertake the process of mind patterning still does not exist, long standing treaties such as the Bangkok Agreement exist to prevent the process from ever being used legally. These treaties were jointly signed by all major nations on Earth and later, the settled systems in Clement Sector, to prevent the transfer of an intelligent being's brain patterns into a biosynth chassis.

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Chassis Type

Type	Sub Type	TL	Chassis Weight Modifier ¹	Cost Modifier	Base Armor
Framework		6	-	x0.5	None
Angular	Rectangular	7	x1	x1	Mesh
	Wedge	7	x1	x1	Mesh
Rounded	Cylindrical	8	x1	x1.2	Mesh
	Cone	8	x1	x1.2	Mesh
	Spindle	8	x1	x1.1	Mesh
Spherical	Sphere	8	x0.8	x1.5	Mesh
	Dome	8	x0.9	x1.2	Mesh
	Oblate	8	x0.9	x1.2	Mesh
Disk		8	x0.9	x1.2	Mesh
Contoured	Basic	8	x1	x1.5	Mesh
	Standard	8	x1	x2	Mesh
Anthropomorphic		8	x1.1	x2.5	Mesh
Biosynth ²		12	x1.1	x10	Jack

¹ Where the chassis weight modifier is less than 1x ensure the chassis internal space has the same multiplier applied.

² Type 1 (TL 12), Type 2 (TL 13)



ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Chassis Size

Chassis Weight (Kg)	Internal Space (Kg)	Chassis Frame Weight (kg)	Cost (Cr)	Base STR	Notes
1	0.8	0.2	500	1	
5	4	1	750	1	
10	8	2	900	1	
15	12	3	1000	1	
20	16	4	1100	1	Average human child torso size
25	20	5	1200	1	
30	24	6	1300	2	
35	28	7	1250	2	
40	32	8	1500	2	
45	36	9	1750	2	
50	40	10	2000	3	Average human torso size
55	44	11	2250	3	
60	48	12	2500	3	
65	52	13	2750	3	
70	56	14	3000	4	Larger human torso size
75	60	15	3250	4	
80	64	16	3500	4	
85	68	17	3750	4	
90	72	18	4000	5	
95	76	19	4250	5	
100	80	20	4500	5	
150	120	30	4750	7	
200	160	40	5000	10	
250	180	50	5250	12	
300	240	60	5500	15	
350	280	70	5750	17	
400	320	80	6000	20	
450	360	90	6750	22	
500	400	100	6500	25	
550	440	110	6750	27	
600	480	120	7000	30	
650	520	130	7250	32	
700	560	140	7500	35	
750	600	150	7750	37	
800	640	160	8000	40	
850	680	170	8250	42	
900	720	180	8500	45	
950	760	190	8750	47	
1000	800	200	9000	50	
2000	1600	400	9500	100	
3000	2400	600	10,000	150	
4000	3200	800	20,000	200	
5000	4000	1000	30,000	250	
6000	4800	1200	40,000	300	
7000	5600	1400	50,000	350	
8000	6400	1600	60,000	400	
9000	7200	1800	70,000	450	
10,000	8000	2000	80,000	500	
15,000	12,000	3000	90,000	750	
20,000	16,000	4000	100,000	1000	

Chassis Breakdown

As touched on briefly in the chassis type description on page 14, the chassis consists of three major parts.

Chassis Weight

Chassis Weight is the actual weight of the chassis and includes the internal Chassis Frame, inner and outer casing, integral armor and the connection points for arms, head and locomotion. Chassis Weight will be modified according to the chassis type chosen, if additional armor is added, or other chassis options are chosen.

Along with the weight of arms, locomotion and the head, Chassis Weight determines the Overall Weight of the robot before adding additional external components such as weaponry tool packages.

Frame

The Chassis Frame is the internal skeleton or support structure of the robot. The frame provides support and structural strength for the chassis and allows internal components to be installed and secured within the chassis inner and outer casing. A Chassis Frame can be modified to provide more strength or made lighter, taking up less internal space (see pages 20-23). For a Framework Chassis type the Chassis Frame weight is used when determining Overall Weight rather than using Chassis Weight.

Internal Space

The remaining space within the chassis is termed Internal Space. This is where all internal components such as the Power Supply, Core Computer Module, Core Data Processor, sensors and integrated weapon mounts are installed. The overall weight of installed internal components must not exceed the allowed internal space of that chassis size. Chassis Type modifiers will reduce available internal space if the modifier is less than 1x.

Chassis Options

Additional Armor

Differing chassis types provide some form of basic armor protection which in most cases is sufficient. For any chassis type other than framework (which cannot have armor protection) or biosynth (can wear additional armor protection as required) the level of inbuilt armor can be improved, though at additional cost and chassis weight.

The table below outlines chassis armor upgrades and their effect on chassis weight and cost. To use the table simply select the armor desired and apply the multiplier to both the cost and weight of the chosen chassis. Inbuilt armor cannot be upgraded after the robot has been constructed.

Armor Types

Type	Weight Modifier	Cost Modifier
Cloth	x1.1	x1.2
Combat Armor/10	x3	x2
Combat Armor/11	x4	x3
Vehicle Plating 1*	x8	x10
Vehicle Plating 2*	x10	x12
Reflec	-	x1.5

* Vehicle Plating number is the equivalent point of Crystaliron vehicle armor

As noted before a biosynth's inbuilt subdermal armor is equivalent to Jack (see **Clement Sector: The Rules**, p.55) and cannot be further improved. However, a biosynth can simply wear additional armor as required, no different than a normal Human, Altrant or Uplift.

Advanced Frame

Using more advanced materials a chassis frame can be made lighter and smaller but still have the same strength and toughness. A designer can elect to add the difference in weight to the internal space of the chassis size allowing for more components or to reduce the chassis weight by that percentage, reducing the robot's overall size. Advanced Frames cannot be strengthened. The table below lists adjustment and chassis cost percentage per tech level.

TL	Adjustment	Cost
10	10%	20%
11	15%	30%
12	20%	40%

Aerodynamic

Providing more efficiency in either water or in the air streamlining increases a chassis cost by 20% and provides an increase of 15% movement speed.

Appearance

A pleasing appearance might be either desired or important for the function that a fauxskin contoured or a biosynth robot is intended to undertake. For example, a personal companion Gynoid/Android or personal servant will most often be required to appear handsome or beautiful.

Appearance	SOC Modifier	Cost Modifier
Beautiful	+4	x1.5
Attractive	+3	x1.2
Handsome	+2	x1.1
Average	+0	Base cost
Ugly	-2	x0.9
Hideous	-4	x0.7

Fauxskin

Providing a Contoured or Anthropomorphic with a soft and realistic looking covering, fauxskin can be customized to replicate any type of creature's skin. This allows the robot to have a soft skin covering appropriate to the animal (or human) so that the robot does not look like an obvious artificial construction.

Early versions of fauxskin are first available at TL8 costing twice that listed on the table and provides only half the listed positive DM for appearance. At TL10 fauxskin is indistinguishable at a distance from biological skin costing 1.5x cost and provides -1 to the listed positive DM for appearance. At TL11 fauxskin is only distinguishable after a detailed visual inspection and the values listed in the table apply.

Fauxskin provides no additional armor, adds 10% to the overall weight of the robot and adds a further 50% to the cost of the robot's chassis, head and any arms and legs.

Frame Strengthening

Chassis frames can be strengthened to provide additional protection. For every 20% increase in frame weight the robot gains 2 additional hit points. Each 20% increase costs an additional 20% chassis cost and reduces the internal chassis space by 20%. A maximum of 6 additional destroyed hit points can be added. See Hit Point Determination on page 77 for explanation on robot hit points.



Improved Protection

Hardened Systems

A robot can be hardened against electromagnetic pulse weapons. A chassis that is hardened is immune to EMP but costs 50% more.

Sealed systems

A robot can be protected from water and atmospheric environments that would normally cause damage. A chassis that is sealed is immune to these elements but costs 50% more. A Biosynth Chassis is already sealed against water.

Both options can be applied by doubling the cost (+100%)

Radiation Shielding

A robot expected to work in high radiation environments for extended periods of time can have radiation shielding added to the chassis protecting the robot up to 1000 rads. Shielding can be purchased in 100 rad increments which increase the weight and cost of the chassis by 20% per increment.

Reinforcement

Reinforcing a chassis provides more resistance to physical damage that could destroy the robot. Adding 2 destroyed hit points will increase the chassis weight by 10% and price by 50%. A maximum of 6 additional destroyed hit points can be added. See Hit Point Determination on page 77 for explanation on robot hit points.

Design example – 1. Chassis

The *Clifford* is an average height humanoid robot
Chassis is contoured type with modifiers of 1x weight and 2x cost
Chassis = 50kg, costing 2000Cr = 2000 x 2 = 4000Cr
Strength Modifier = 3

2. Power Supply

Installed in the chassis, a power supply provides power for the robot to move and operate installed components. Robots can be constructed without a power supply, relying on an external power source connected via an external power port.

There are three types of power supply available for installation into a robot: Fuel Cells, Fusion Reactors, and Batteries.

Fuel Cell

Fuel cells are advanced electrochemical devices utilizing a hydrogen/oxygen reaction to generate power. Powerful and efficient, they are a sensible choice for a powering a robot to be used in a wide variety of longer duration roles.

Robot fuel cells are a closed hydrogen/open oxygen design with fuel consumption listed for each available type in the table below. These fuel cells carry their own supply of hydrogen but draw a supply of oxygen from the air to provide the electrochemical reaction necessary to create electrical power. If the robot needs to operate in a hostile atmosphere or in vacuum, then a supply of oxygen must be provided which is consumed at 10x the normal rate.

Fuel cells produce pure water as a reaction by-product at a rate of 10x the fuel consumption rate of the fuel cell type installed. Typically, waste water produced by these advanced fuel cells is eliminated by evaporation processors and need not be considered as part of the design process or the operation of the design once constructed.

Fusion Reactor

Fusion reactors are a bigger but more powerful power supply which limits their use to larger robot chassis sizes. Reactors can only be made so small regardless of the tech level they are produced at and the smaller the reactor the less power efficient they are. Even with these restrictions the fusion reactors high power output is a logical design choice for larger robots using components with high power requirements.

Batteries

Efficient and compact batteries with longer sustained power output are available for use as a robot power supply though they are very expensive and offer considerably less operational duration than fuel cells or a fusion reactor. For robots such as servicebots that have easy access to external power sources for recharging, batteries are a preferred option. They can also be installed for use as a backup power source in case of fuel cell or fusion power supply failure.

High capacity batteries are available that provide double the power point storage but are five times the cost per kilogram of the selected battery type.

To calculate the duration length in hours that the robot can operate using batteries as a primary or secondary power source, divide the total power point requirement of all installed components into the total power point storage provided by the battery or battery array. A robot should have an operational duration of two days before it is required to recharge if it is expected to be away from a charging point for long periods.

The total recharge time for batteries in hours is 5% of the total power points able to be stored by the batteries in minutes rounded up to the nearest 15 minutes. However, recharge time for any size single battery or battery array cannot be less than one hour.

The output of any power supply that is chosen must provide enough power to energise the robot's arms, locomotion, brain, sensors and other components. Care must also be taken to ensure the power supply is able to be installed in the chassis leaving enough internal space for other components and power supply fuel (if required).

All power supplies measure output in power points. One point provides power to any component requiring one point for one hour or if there is a component using 0.5 power points then that component can be powered for two hours and so on.

Power Saving Modes

A robot's basic software contains routines to allow the function of reducing or stopping power to unused components in order to conserve power. It can also go into hibernation mode to conserve power during longer periods of non-use. This is particularly important for robots equipped with batteries and a minimum of two hours of hibernation is required per day for biosynths.

Power Modes

Power Mode	Power Use Reduction
Component Reduction	-10%
Component Suspension	-25%
Stand-by	-50%
Hibernation	-75%

Both fuel cells and fusion power supplies require liquid hydrogen fuel to operate and the power supply table lists the fuel consumption in kilograms per hour for each type of power supply. Fuel tanks are usually installed in any remaining space in the chassis after the robot design sequence has been completed. It is recommended that space for a fuel tank is sufficiently large enough to provide fuel to the power supply for at least one week of operations, ideally with a supply for an operational duration of 30 days.

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Fuel Cells

TL	Output	Weight (Kg)	Cost (Cr)	Fuel Use (Kg/hour)
8	8	25	650	0.007
8	15	45	850	0.011
8	20	65	1000	0.014
8	30	85	1200	0.018
8	40	105	1400	0.021
8	60	135	1500	0.025
9	10	20	600	0.007
9	20	35	800	0.011
9	30	55	1000	0.014
9	40	75	1200	0.018
9	50	95	1300	0.021
9	60	115	1400	0.025
9	80	125	1600	0.032
9	90	135	1800	0.039
10	15	20	600	0.007
10	25	35	850	0.011
10	35	55	1000	0.014
10	55	75	1200	0.018
10	75	130	1400	0.021
10	105	160	1600	0.025
11	20	20	550	0.007
11	35	35	750	0.011
11	50	55	950	0.014
11	60	75	1100	0.018
11	80	115	1200	0.021
11	100	125	1500	0.025
11	125	155	1600	0.032
12	25	20	550	0.007
12	40	35	750	0.011
12	60	55	900	0.014
12	80	55	1100	0.018
12	100	75	1300	0.021
12	120	95	1500	0.028
12	145	125	1600	0.035

Fusion Reactors

TL	Output	Weight (Kg)	Cost (Cr)	Fuel Use (Kg/hour)
10	150	1000	280,000	0.75
10	250	1900	320,000	1.00
10	500	2500	400,000	1.20
11	250	950	260,000	0.75
11	500	1800	310,000	1.00
11	750	2400	370,000	1.30
12	350	900	270,000	0.75
12	500	1200	300,000	1.00
12	900	2000	380,000	1.10
12	1200	2500	430,000	1.35

Battery

TL	Storage*	Cost (Cr)
8	5	750
9	10	1200
10	20	1800
11	25	2400
12	30	2800
13	40	3400

* Storage is power output per kg of battery. Cost is per Kg

External Power Ports

Power Interface

Installing a power interface allows a robot to use its power plant to power an external component, power the robot itself (a stationary assembly line robot for example) or both.

Charge Port

A charge port is similar in function to the power interface but only allows for recharge of the robot's internal batteries. A robot's basic software routine reinforces a 2% power buffer (unless overridden by a direct command) to ensure the robot has enough power to find a power source to "plug in" or connect wirelessly to and recharge.

For both types the external power port requires 1% of the total power required to power the external component or robot for one hour. For a charge port which will recharge that robot's batteries the power requirement is the same. A dual plug-in/wireless charge port is available with the same requirements but twice the cost. Wireless charge range is 5m and charging will require twice the normal charge time, but it does provide for a constant charge if the robot is nearby.

External Power and Charge Port

Power Requirement	Weight (Kg) per Power Requirement	Cost (Cr) per Kg
1% of power supplied via external power port	1	250

For example, a stationary sub-assembly robot requires 30 points of power from an external power supply in order to operate. Providing a connection to external power, the external power port requires 0.3 points, has a space requirement of 0.3kg and costs 75Cr. For the robot to be adequately powered it would need 30.3 power points to function.

Both types of ports can be installed together.

Design example – 2. Power Supply

As the *Clifford* will be close to a source of external power for recharging, batteries are chosen to be used. A TL 12 battery is chosen, providing 30 power points per hour per kg.

The robot needs 26 power per hour to function. For 38 hours duration $26 \text{ power} \times 40 \text{ hours} = 1,040 \text{ power}$
 $1,040/30 = 35$. Thus 35kg of batteries are required.

An external Data Port is also required to allow the *Clifford* to recharge

$26 \text{ power points per hour} \times 0.01 = 0.3$, weighs 0.3kg at a cost of $0.26 \times 250 = 65\text{Cr}$

To recharge fully depleted batteries the *Clifford* requires $1,040 \times 5\% \text{ minutes} = 1,040 \times 0.05 = 52 \text{ minutes}$

This length of time is rounded up as it is under one hour = 60 minutes.

3. Arms

Arms provide the robot with the ability to interact with the world around them and allow the robot to perform its desired function(s).

All arms, regardless of type, have kinesthetic sensors inbuilt to provide feedback so to ensure that the robot is aware of the position or location of the arm at all times. Arm weight cannot exceed 40% of the chassis weight.

Assembler Arms

These arms are utilitarian in nature and have various tools or devices attached to them to allow the robot to construct, disassemble or repair any manner of items. They are capable of performing tasks from microscopic assembly operations to starship hull plating assembly work in orbital dockyards. These types of arms tend to be restricted to robots within the industrial sector and cannot be added to contoured, anthropomorphic or biosynth chassis types.

Assembler arms can carry up to 2 times their weight in installed sensors, components or specialist tools.

Standard Arms

A standard arm is the most versatile of the three common types available for use by a robot. Able to be adapted to perform any task and function, they come with human type hands and tactile sensors as standard but can have the hand type changed if desired. Hand types are listed in the table on page 33.

Standard arms can be added to a contoured, anthropomorphic or biosynth chassis and must have the chassis cost modifier and weight modifier (if weight modifier is greater than 1x) applied. Typically, a robot in the shape of a typical human would use light or small standard arms. Biosynth arms are required to have a 10x cost modification applied.

Standard arms can carry 1.5 times their weight in installed sensors, components or weapons.

Tentacle Arms

Specialized arms that consist of short lengths connected by many fully articulated joints that provides great flexibility. This makes the tentacle superior in dexterity but lower in strength to other arms of similar size. Tentacle arms cannot have any components or weapons installed.

Arm types and characteristics are listed in the table below.

Arm Types

Type	Size	Weight (Kg)	Power	Cost (Cr)	DEX Mod	STR Mod
Assembler	Very Light	1	1	800	+2	-
	Light	6	2	500	+1	+4
	Medium	12	4	700	-1	+8
	Heavy	30	8	900	-4	+20
	Very Heavy	50	10	1200	-6	+30
Standard	Very Light	1	1	850	+3	-
	Light	3	2	600	+3	+2
	Small	6	4	750	+2	+3
	Medium	10	8	1100	+1	+5
	Heavy	35	15	1200	-	+12
	Very Heavy	50	25	1600	-2	+25
Tentacles	Very Light	3	2	1100	+4	-
	Light	6	10	800	+3	+1
	Medium	10	15	1300	+2	+6
	Heavy	25	25	1100	+1	+10

Arm Options

Branching

Providing the robot with multiple arms branching out from the arm's chassis connection or from a location along the arm itself, branching arms allow the robot to increase the rapidity of tasks or increase the number of tasks being undertaken at the one time. They also allow the robot to be equipped with multiple tool packages without need to change over for each different task. Branching arms must use a standard arm as the base.

Up to five branches to a standard arm may be added, each increasing weight to that arm depending on where on the main arm that branch is attached.

If only one additional branch is added (bifurcated) then it can be designed to fold tight along the main arm when not in use for an additional 750Cr.

Branch Type	Cost (Cr) when located at		Weight Mods		STR and DEX Mod
	Top (shoulder)	Mid (elbow)	Top	Mid	
Bifurcated	900	1100	x2.1	x1.8	-1
Trifurcated	1500	1800	x2.8	x2.2	-2
Add Branch	500	750	x1.3	x1.1	-1 per branch

Branching cannot be added to arms attached to contoured, anthropomorphic or biosynth chassis types. Nor can fauxskin covering be used.

Characteristic Increase

Strength and Dexterity modifiers can be improved for standard arms. For each +1 increase the cost of the arm increases by 20%. Any increase in strength modifier also increases the weight of the arm by 10%. A maximum of a +2 increase can be gained this way.

Characteristic Decrease

Strength and Dexterity modifiers can also be decreased for standard arms. For each -1 the cost of the arm decreases by 10%. Any point decrease in strength modifier will also decrease the weight of the arm by 10%. A maximum decrease of -3 can be obtained this way.

Hydraulic Actuators

Using hydraulic fluid to provide movement to the arm, hydraulic actuators allow the arm to have immense strength compared to a non-hydraulic arm of the same size. The tradeoff for +4 strength comes at the cost of -2 dexterity. Arms with hydraulic actuators cost an additional 1200Cr and cannot be covered in fauxskin or used by biosynths.

Retracting

Arms up to medium size can be made to retract into the chassis of the robot providing there is enough internal space for the chassis size selected. This doubles the arms weight so to provide the space within the chassis for the arm and the retraction mechanism. A retractable arm costs an additional 750Cr. Retracting or extending such an arm is considered a Minor Action. Biosynth robots cannot have retracting arms.

Tail

Available specifically for contoured, anthropomorphic and biosynth chassis types less than 30kg, tails allow the robot to further mimic the creature they are designed to imitate. Tails can be prehensile or not, any shape or length and can be encased in fauxskin if not a biosynth. Chassis modifiers must be applied to any chosen tail type.

Tail Types

Type	Weight (Kg)	Power	Cost (Cr)	DEX Mod	Notes
Vestigial	0.25	-	150	-	
Very Short	0.50	0.1	200	-	
Short	0.75	0.2	250	-	
Medium	1.00	0.5	300	+1	
Long	1.25	0.75	350	+1	
Prehensile	x1.2	x1.2	x2	+1	Athletics Task Software Required

Tails of sufficient length also provide the robot with additional dexterity, enabling the tail to be used as a “rudder” when making a tighter and higher speed turn at speed.

Prehensile Tails provide the robot with better dexterity and better ability to climb and move far more easily between objects. Any tail longer than very short can be made prehensile. Prehensile tails cannot be added to a chassis size larger than 15Kg.

Wings

Available specifically for contoured, anthropomorphic and biosynth chassis weights less than 120kg, wings allow the robot to further mimic the creature they are designed to imitate. There are several types of wings available for a robot to use with each type allowing differing modes of flight and the wings must be encased in an appropriate fauxskin if not a biosynth. Chassis modifiers must be applied to any chosen wing type.

Flight Wings are only available to robots of a total weight of less than 25kg, while gliding type wings allow flight for chassis weights up to 120kg. Gliding wings allow for a short-powered flight to an appropriate altitude to commence glided flight, hence power requirements are higher for that purpose. Once gliding commences power requirement for each wing is halved. Whatever type is used the speed produced is comparable to the creature the robot is imitating.

Wing Types

Type	Sub Type	Weight (Kg)	Power	Cost (Cr)	DEX Mod
Flight	Very Small	0.10	0.2	150	+4
	Small	0.40	0.5	200	+3
	Medium	1.00	1.0	300	+1
	Large	2.00	1.5	400	-
	Very Large	3.00	2.0	500	-1
Gliding	Small	1.00	1.5	150	+2
	Medium	2.00	2.5	250	+1
	Large	5.00	3.0	450	-1
	Very Large	10.0	5.0	650	-3

Table data is per wing

Wing dexterity only applies when wings are used in flight. If the robot is on the ground the Dexterity Modifier becomes zero for all types. Flyer (Winged) task software is required if wings are to be used by the robot.

Hands

Standard arms come equipped with hands appropriately sized to the size of the arm, however a designer might require differing options. Assembler and tentacle arms cannot have hands.

Large

Installing a larger set of hands into a smaller arm reduces the robot's dexterity by -1. Only a hand one arm size larger than the arm it is to be attached to can be used.

For example, a medium hand can be attached onto a small arm but not a light arm.

Micro Manipulators

Equipping a robot with micro manipulators allows it to undertake precision operations up to and including nanometer scale range. Such precision tools are fragile though and will not sustain rough handling and are often attached to a retracing arm to protect them when not in use. Micro Manipulators are also available as a Multi-tool option.

Multi-tool Socket

These can be installed in lieu of hands for specialist roles. This allows a robot to have a specific device for a specific task. The multi-tool socket allows tools or equipment to be quickly removed and replaced with another tool or device as a Minor Action. This can be done by the robot itself if it has another other arm equipped with standard hands.

Pincer

Pincers are simple mechanisms that allow the robot to grasp an object relatively easily but manipulate it with great difficulty (any Average task becomes Very Difficult). Pincers reduce a robot's dexterity by -3 and are the only hand option available prior to TL8.

Grippers

Grippers are a flatter, broader pincer variation with the same characteristics as the standard pincer. Installing a large gripper into a smaller arm reduces the robot's dexterity by -3. Only a gripper one arm size larger than the arm it is to be attached to can be used.

For example, a very large gripper can be attached onto a large arm but not a medium arm.

Tendrils

Essentially a long thin hand with elongated digits, tendrils are only marginally less effective at precise manipulations than a standard hand.

Tendrils are capable of being used as a weapon. In these instances, it acts as a blade. However, they are capable of non-lethal attacks by grappling with those that the robot wishes to capture. Tendrils being used in this manner provide the robot with a +2 DM to all grapple attacks.

Hands

Hand Type	Weight (kg)	Cost (Cr)	Power Req.	Notes
Large	1.1x arm	250	0.5	-1 DEX
Micro Manipulators	0.15	1000	0.5	Not available for biosynths
Multi-tool Socket	-	150	-	Not available for biosynths
Pincer	-	50	0.5	-3 DEX
Grippers	-	60	0.5	-3 DEX
Grippers (Large)	1.1x arm	250	0.5	-3 DEX
Tendrils	0.2	450	0.5	+2 Grapple Attacks

Design example – 3. Arms

The *Clifford* needs a pair of arms suitable for the task it needs to undertake. Standard Arms (small) are chosen each being 6kg in weight, requiring 4 power points and costing 750Cr. Each arm provides the robot with a DEX Mod of +2 and a STR Mod of +3. As the *Clifford* has a contour type chassis then that type's modifiers must also be applied. Weight = $2(6 \times 1) = 12\text{kg}$ and Cost = $2(750 \times 2) = 3,000\text{Cr}$. Note that standard arms have hands and touch sensors installed as standard.

4. Head

Adding a head to a chassis adds to the internal space of that chassis and adds to overall weight of the robot.

A head must be a minimum of 5% of chassis weight and cannot exceed 40% of that space. Multiple heads can be installed but the combined total cannot exceed 40% of chassis weight. Installing a head onto a robot allows a convenient place to locate sensors, optics and communication arrays. Calculation for the weight and cost of the head must take into account any chassis modifiers. Interior space available is 90% of the overall weight of the head.

The cost and weight of a head can be calculated using the formula below:

Cost = Head Percentage/100 x Chassis Cost

Weight = Head Percentage/100 x Chassis Overall Weight

For example, a head to be installed on a 100Kg contour type chassis is to be 5% of the chassis weight.

Cost of head = $5/100 \times (4500 \times 2) = 450Cr$

Weight of Head = $5/100 \times (100 \times 1) = 5kg$

Note that a typical human head weighs from 4.5kg to 6kg.

Provision for the head to be able to move requires power points equal to 25% of its weight. The cost and mechanism to provide a head the ability to move is included in the overall cost of the head.

For a contoured chassis installing a head unit it is preferred but, depending on the desired contour shape of the robot, not essential. A head must be included when selecting anthropomorphic and biosynth chassis types.

Head Options

Facial Expression Capability

Robots that outwardly look human but have no facial expressions can be a significant issue for many people. This prompted early twenty first century robot engineers to work towards providing the means to provide a robot mimicking a human the ability to have a facial expression capability. The earliest forms of facial expression emulation were only a moderate success until the development of fauxskin.

For robots that are required to interact constantly or be in close contact with humans, some form of facial expression capability is required.

Facial expression capability is not as refined or as sophisticated as a biosynth, but it is not far short, providing a +1 SOC modifier.

Adding facial expression capability to a robot head requires 0.5 power points and adds an additional 50% cost to the head. This additional cost accounts for the addition of necessary sub micro-servos and associated electronics. There are no additional weight requirements. Facial expression capability requires Emotion Emulation core software to be used.

Spherical Chassis Head

Rather than installing a standard head on a spherical chassis, the designer can opt to use up to 20% of the upper hemisphere of the chassis as the “head” of the robot. This adds a further 10% to the cost of the chassis and requires the same power requirements as a normal head if required to move. This head type does not provide additional internal space nor affect overall weight like the standard head.

Design example – 4. Head

The *Clifford* being a humanoid design requires a head in which it is intended to install sensors and communications components.

A 5kg head allows for enough space for the required components and is 10% of the chassis weight.

$10/100 \times 50 = 5\text{kg}$ (This sits within a standard human head weight range)

Available Internal Space is 90% of the weight of the head = $90/100 \times 5 = 4.5\text{kg}$

Cost is calculated as head percentage x chassis cost = $10/100 \times 4,000 = 400\text{Cr}$

The head is intended to be able to move and requires power = $25\% \times \text{head weight} = 25/100 \times 5 = 1.25$

At this stage the sum of the overall weight of the robot = chassis + arms + head = $50 + 13.2 + 5 = 68.2\text{kg}$

5. Locomotion

If the robots function requires it to be mobile, then it needs to have some form of locomotion. There are several types of locomotion available for use. All types of locomotion have a base speed which can be improved. This increases the weight and cost.

Locomotion types all require the robot to have task software appropriate to the type installed. Leg locomotion is not required to have task software installed for operation.

Required Task Software per Locomotion Type

Type	Task Software
Air Cushion	Drive (Hover)
Anti-Grav	Flyer (Grav)
Leg	None Required
Rotor	Flyer (Rotor)
Tracks	Drive (Tracked)
Water Jet	Seafarer (Submarine or Motorboats)
Water Screw	Seafarer (Submarine or Motorboats)
Wheels	Drive (Wheeled)

Air Cushion

This form of locomotion allows the robot to hover approximately a meter above ground kept aloft by a cushion of compressed air created by ducted fans underneath the chassis. Air Cushion locomotion requires an atmosphere and gravity of some form to “push against” to operate. It cannot operate in a vacuum. It is however able to move across most terrain but cannot fly like a grav vehicle or aircraft.

Anti-gravity

Grav modules are an expensive option for a robot but provide the best mobility of any available locomotion type. Grav equipped robots can move across any terrain with ease, can hover and can operate equally well in any atmospheres or in space.

An anti-gravity locomotion unit is installed directly into the chassis internal space. Type C and Type D units cannot be installed in a chassis larger than 150kg.

Ideal for robots lacking interior space for a standard Anti-gravity module, anti-gravity Nodes are external units which plug directly into power and control links at the base of the robot's chassis. The links require 2% of the weight of the node as internal space.



BW

Legs

Flexible limbs that provide a robot with excellent stability, a robot can have up to eight legs installed. Legs provide excellent stability on rough ground.

Robots with more than two legs have further stability providing a +2 DM on all balance rolls, however they are not as quickly reacting as bipedal robots with a -1 DM applied on reaction movement rolls.

If the robot has a Contoured, Anthropomorphic or biosynth chassis then the legs must be configured to suit the specific shape of the robot. Some leg examples are listed below. In all cases, the leg weight and cost must be adjusted using the modifiers for the chassis type listed in the chassis type table on page 17.

- Humanoid
- Digitigrade
- Insectoid
- Tentacular

Tracks

Better than wheels in rough terrain, tracks provide the robot with +1 DM for any required balance or stabilization rolls when traversing rough terrain. Unfortunately, they are slower than a robot with wheels. Tracks are ideal for robots undertaking such tasks as cargo handling or construction.

Waterborne (Water Screws and Water Jets)

Both Water Screws and Water Jets provided locomotion for robots designed to operate solely on or under water. Using water sucked through a forward mounted intake, water jets force water at high velocity out of adjustable water pipes at the rear of the chassis which provides high maneuverability. A water screw uses a propeller to provide movement. It is slower and less maneuverable than a water jet.

Wheels

Wheels are an ideal choice for robots that have restricted work environments such as indoors or if operating solely in urbanized areas. They receive a +1 DM for any required balance or stabilization rolls when on roads or other flat surfaces. Wheels are poor in rough terrain and suffer a -1DM for any balance or stabilization rolls that are required. Adding a 4WD capability increases final weight and cost by 50%. The Robot's speed is also reduced by 20%.

Rotor

Using a rotor system much like a helicopter the robot can hover and quickly fly from one location to another. Robots equipped with rotors are vulnerable to damage if in combat.

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Locomotion Types

Type	TL	Base Speed km/h	Base Weight %	Max Speed km/h	Weight Mods per increase in speed	Cost Cr) per Kg	Internal Chassis Weight
Tracks (pair)	5	5	20%	100	15% per 20kph	50	30%
Water Screw	5	15	15%	40	10% per 5kph	60	40%
Wheels (each)	5	100	5%	250	10% per 50kph	40	20%
Rotor	6	120	20%	600	20% per 100kph	160	30%
Water Jet	7	20	15%	60	10% per 10kph	85	50%
Air Cushion	8	20	20%	80	10% per 10kph	280	50%
Leg	8	10	12%	70	10% per 10kph	110	8%
Legs (pair)	8	10	24%	70	10% per 10kph	220	15%
Anti-Grav A	10	200	15%	800	15% per 100kph	1000	100%
Anti-Grav B	10	200	5%	600	10% per 100kph	10,000	100%
Anti-Grav Node	10	200	15%	800	10% per 100kph	1500	2%
Anti-Grav C	12	250	15%	1000	8% per 50kph	1200	100%
Anti-Grav D	12	250	5%	850	5% per 50kph	12,000	100%
Anti-Grav Node	12	200	15%	1000	8% per 50kph	1800	2%

Base Speed is the default speed of the installed type.

Max Speed is the maximum that locomotion type can achieve.

Base Weight is percentage of chassis weight + weight of arms (if any) + head (if any) + external tool packages (if any) required for the locomotion base weight.

Weight Mod is the additional percentage increase in locomotion base weight per additional speed performance required.

Cost is the cost per Kg of total weight in Hub Federation Credits.

Internal chassis Weight is the percentage of the total locomotion weight internal to chassis.

Locomotion Power Requirements

All forms of locomotion require power to operate. Any increase in weight above the base weight to increase speed will require more power to achieve that improved performance. Additional power requirement calculations are rounded up.

Type	Base Power	Additional Per 5kg Increase
Tracks (pair)	4	0.5
Water Screw	3	0.25
Wheels (each)	1	0.25
Rotor	4	0.25
Water Jet	3	0.25
Air Cushion	3	0.25
Leg	1	0.1
Legs (pair)	2	0.2
Anti-Grav	10	1
Anti-Grav B & D	5	0.5

Locomotion Dexterity Modifier

Each different locomotion type will provide a modifier to the derived dexterity of the robot it is installed into. These modifiers can be found listed in the table below.

Type	DEX Mod
Tracks (pair)	2
Water Screw	-1
Wheels (each)	1
Rotor	2
Water Jet	0
Air Cushion	1
Leg	2
Legs (pair)	4
Anti-Grav	5

Locomotion Speed Limiting

Although a robot will vary the speed in which they are travelling as part of their normal movement, there may be a requirement that a design will require a capped maximum speed lower than the locomotion types actual base speed.

Some locomotion types can have the base speed reduced by up to 90% if so required, while other types (such as Air Cushion or Waterborne) cannot have any permanent reduction of base speed. For instance, a wheeled cleaner robot will not ever require the robot to have an ability to travel 100kph down a corridor or around a room. Base speeds can be lowered by reducing the base weight of the locomotion unit and the amount of power passed to it.

Type	Minimum Speed Allowed km/h	Base Speed Drop Increments km/h	Power Reduction per Drop	Base Weight Reduction % per Drop
Wheels (each)	10	10	0.05	5
Rotor	60	20	0.25	15
Anti-Grav A & C	100	50	2	10
Anti-Grav Node	100	50	2	10

For example, a wheeled robot must have a capped maximum speed of 30km/h, a 70km/h (or 7 drop reduction) in base speed for wheels. To calculate the weight and power requirements to provide the new base speed then apply $7 \times 5 = 35\%$ base weight reduction and $7 \times 0.05 = 0.35$ power reduction per wheel.

Design example – 5. Locomotion

The *Clifford* will need legs for it to be able to move around.

A pair of contoured legs have a base weight of $24\% \times \text{weight (chassis, arms \& head)} = 24/100 \times 67.3 = 16.15 = 16.15 \times 1$ (chassis weight factor) = 16.15kg

Cost for the legs is = leg weight x cost per kg = $16.15 \times 220 = 3,553 = 3,553 \times 2 = 7,106\text{Cr}$

Legs require a percentage of their weight within the chassis internal space = $15/100 \times 16.15 = 2.4\text{kg}$

The pair of legs requires 2 power points and provide a DEX Mod of +4

6. Armament

Robots can carry weapons as integrated or external mounts. Unencumbered by reloading magazines or power packs and limited only to the amount of power that can be drawn from internal power supply or by the capacity of an internal magazine, they can provide sustained fire against any foe(s).

Of course, a robot, suitably outfitted with standard arms, can simply carry a weapon rather than have external or integrated mounts. These weapons can also be connected to the robot's internal power supply or an ammunition magazine should it be desired. In this case, use the Integrated Weapon weight requirement to allow for the feeds.

Energy weapons, gauss weapons, autocannon and rotary weapons all require power.

Ammunition feeds and power feeds will cost 25% of the weapon cost per feed required. For example, a Gauss Rifle requires both power and ammunition feeds costing an additional 50% of the weapon cost.

Robots have a maximum number of internal or external mounts based on their chassis size. The table below lists the allowable mount number for chassis weights. Any carried weapon linked or unlinked must be included in the total listed in the table.

A biosynth chassis cannot have internal or external weapons nor can they have feeds to a carried external weapon.

Chassis Weight (Kg)	Maximum Mount #
0-10	-
20-40	1
50-160	2
160-400	3
500-10,000	4
10,000+	6

Heavy weapons cannot be installed into or onto a robot chassis less than 10,000kg.

External Mount

External mounts are installed on mounts on the external surface of the robot. These might be part of an arm or installed on a shoulder or on the chassis. They are considered to be protected by the same level of armor as the robot. Weapons mounted externally do not use interior space but are a highly visible reminder that the robot is armed. An integrated mount requires an additional 10% of the selected weapons weight which is added to the overall weight of the robot. This additional amount allows for the mounting to which the weapon is fitted as well as any power and ammunition feed connections.

The weight of any weapons mounted externally must be considered when calculating the robot's locomotion requirements.

For example, a robot is armed with an auto rifle mounted externally on the shoulder. The external mount and auto rifle increases the overall weight of the robot by 5.5kg. (5kg for the auto rifle and 10% of the auto rifle weight for the mounting.)

Integrated Mount

Integrated mounts allow a carried weapon to be carried within the robot's chassis or arms. This has a number of advantages including concealment, protecting ammunition and power feeds and maintaining any streamlining if required.

An integrated mount requires an additional 10% of the selected weapons weight which is deducted from the internal chassis weight during the robot design process. This additional amount allows for the mount sleeve which the weapon is fitted as well as any power and ammunition feeds.

For example, a robot is armed with an auto rifle within an integrated chassis mount. The integrated mount sleeve and auto rifle decreases the internal space allocation by 5.5kg. (5kg for the auto rifle and 10% of the auto rifle weight for the mount sleeve.)

Arm Mounted Weapons

Able to be installed on standard arms only, arm mounts can be either integrated or external. The size of the arm determines the mount numbers and type of weapon that can be installed. Any weapon added to an arm must be included in that arms component allowance. Weapons mounted on arms cannot be stabilized.

Arm Type	Allowed
Very Light	-
Light	1
Small	1
Medium	1
Heavy	2
Very Heavy	2

Due to their weight and recoil heavy support weapons cannot be installed on any robot arm.

Ammunition Magazines

If the robot is to have a supply of ammunition for any carried projectile weapon, then a magazine must be included in the design. This can be as small or as large as space permits. To calculate such space, multiply the number of clips or belts required, multiply by the weight of the clip or belt and add 20% (1.2x).

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

For example, a robot is armed with an auto rifle within an integrated arm mount. It is intended to have 10 clips worth of ammunition (200 rounds). The magazine requires an internal weight of $0.5 \times 10 \times 1.2 = 6\text{kg}$.

Integrated and External Weapon Tables

Projectile Weapons	TL	Power	Weight (Kg)	Mount Weight & Weapon (Kg)	Cost (Cr)	Rounds Clip/Belt	Weight (Kg)/Clip	Cost (Cr)
Auto Pistol	5	0.25	2	2.2	60	10	0.25	15
Carbine	5	0.25	3	3.3	200	10	0.125	20
Shotgun	5	0.5	4	4.4	150	10	0.75	10
Submachinegun	5	0.5	3	3.3	500	20	0.5	30
Auto Rifle	6	1	5	5.5	1000	20	0.5	20
Assault Rifle	7	1	3	3.3	300	20	0.33	30
Body Pistol	7	1	0.25	0.28	500	20	0.05	6
Snub Pistol	8	1	0.25	0.28	150	10	0.03	15
Accelerator Rifle	9	1	2.5	2.75	900	15	0.5	15
Advanced Combat Rifle	10	1.5	3.5	3.85	1000	15	0.5	20
Gauss Rifle	12	2	3.5	3.85	1500	30	0.4	40

Energy Weapons	TL	Power	Weight (Kg)	Mount Weight & Weapon (Kg)	Cost (Cr)
Laser Carbine	8	5	5	5.5	2500
Laser Rifle	9	10	6	6.6	3500
Laser Pistol	12	4	1.2	1.32	1000
PGMP*	12	15	10	11	20,000

* Support Weapon

Light Support Weapons	TL	Power	Weight (Kg)	Mount Weight & Weapon (Kg)	Cost (Cr)	Rounds Clip/Belt	Weight (Kg)/Clip	Cost (Cr)
Light Machinegun	5	1	6	6.6	3000	100	2.5	120
Light Rotary Machinegun	6	2	15	16.5	6000	2500	31	2250
Medium Machinegun	6	2	10	11	7000	100	2.5	120
Medium Rotary Machinegun	6	3	35	38.5	14,000	2500	62	3000

Heavy Support Weapons	TL	Power	Weight (Kg)	Mount Weight & Weapon (Kg)	Cost (Cr)	Rounds Clip/Belt	Weight (Kg)/Clip	Cost (Cr)
Heavy Machinegun	6	3	25	27.5	9000	100	10	250
Heavy Rotary Machinegun	6	4	60	66	18,000	2500	100	4200
Light Autocannon	7	3	500	550	280,000	1	1	5
Grenade Launcher	7	2	6	6.6	400	0.5	0.5	180
Rocket Launcher	7	1	6	6.6	2000	1	1	300
RAM Grenade Launcher	8	2	6	6.6	800	6	0.5	180
Advanced Light Autocannon	10	4	500	550	140,000	200	200	1000
VRF Gauss Gun	12	10	2000	2200	220,000	12,000	200	2500

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Non-Lethal Weapons	TL	Power	Weight (Kg)	Mount Weight & Weapon (Kg)	Cost (Cr)	Rounds Clip/Belt	Weight (Kg)/Clip	Cost (Cr)
Tranq ¹	5	0.5	3	3.3	300	10	0.1	30
Taser ²	7	0.25	1.2	1.32	400	1	0.7	40
Stunner ³	10	0.5	0.25	0.275	600			

¹ See Clement Sector: The Rules, page 72 (Slug Rifle Task Software required)

² Target Dex reduced to zero for ten minutes. Thereafter one Dex point recovery per ten minutes. (Slug Pistol Task Software required)

³ Renders a target unconscious for 1d6 hours. (Slug Pistol Task Software required)

Natural Weapons	Power	Weight (Kg)	Integrated Weight	Cost (Cr)
Tearing Teeth	-	0.01 ²	-	300
Slashing Claws	0.1 ¹	0.01 ³	0.012	400

¹ If retracting

² Teeth weight per 1kg of head

³ Claw weight per kg of arm or leg

Claws can be added to a standard arm or any leg while teeth can be installed within any head. Neither can be installed in biosynth or contoured human shaped robots.

For natural weapon damage consult Clement Sector: The Rules, page 189

Reminder Note

An external mount adds the weapons weight plus 10% to the overall weight of the robot while an integrated mount subtracts the weapon weight plus 10% from the internal space of the robot.



7. Computer

A single component comprised of three physical sub-components, the computer allows the robot to function, carry out tasks and undertake commands. The three sub components of the computer are listed below, with each affecting the other to some degree.

The sophistication and type of the computer's components that are installed into a robot determine that robot's intelligence, education, dexterity and social standing. Known as derived characteristics, these are calculated using the method on page 75.

As technology becomes more sophisticated, faster and more powerful core components are made available. In turn, more sophisticated routines are created to take advantage of these advances. Both push each other to become more and more powerful to the point that for the first time artificially intelligent bio-synthetic robots are much less a dream and far more a reality.

Core Module

The core module provides memory to allow programs and data to be "active" while other less essential programs or data that might be required remain "inactive" or moved to core data storage. As programs or data are required for an action or task they are "swapped" into and out of active memory much like human memory recall.

As technology progresses a core module will allow additional concurrent active programs so to expand the capabilities of the robot and to allow for more sophisticated core processors.

For example, a single TL 13 Core/8 Core Module will allow for a storage of 8. If paired with another module it now has a maximum storage capacity of 16.

Each additional module increases available active storage space and contributes to an increase in intelligence. See table below. Round any calculation increases down.

<i>Core Modules</i>					
Module	TL	Power	Weight (Kg)	Cost (Cr)	Modules required per +1 INT
Core/1	7	1	2	1500	12
Core/2	8	1	2	1600	10
Core/3	9	1	1	1800	10
Core/4	9	1	0.8	2000	5
Core/5	10	1	0.6	2200	5
Core/6	11	1	0.4	2500	5
Core/7	12	1	0.3	3000	2
Core/8	13	1	0.1	3500	2

There must be an appropriate number of Core Modules installed as a module array to provide enough active storage for the Core Data Processor, Core Command Interface and Core Software and to still allow task software programs that are required by the robot to run.

It is also recommended that enough space within the core module array is provided to store up to three primary task software programs.

If there is not enough active storage space within the module array, then the task software program will be part loaded into the remaining space. This will slow the execution of the program and subsequently the robot's action or reaction. The delay will only be very slight so treat that delay as increasing the task duration slightly, however that time delay could be crucial to an outcome.

Core Data Processor

Low Data Core

Suitable only for a robot tasked to undertake simple repetitive tasks, the Low Data Core provides only very basic intelligence and provides no ability to automatically parse data.

High Data Core

Able to process and remember data obtained by its sensors, the robot can also use that data to learn allowing the robot to improve the skill levels of its software should enough synaptic storage also be installed. Commands however must be precise and carefully worded.

Low Autonomous Core

The robot is able to undertake independent actions without being instructed to take those actions. Data obtained by observing the world around it can be processed and conclusions can be derived. The robot can also use that data to learn allowing improvement to the skill levels of its software without external assistance. Commands do not need to be as precise and carefully worded with the robot able to comprehend what it is told even with an accent, use of contractions or slang words.

High Autonomous Core

An improvement of the Low Autonomous Core, there is enhancement in understanding commands, further autonomy of action, and increased sophistication in interacting with the outside world. HAC robots with fauxskin and other specializations are often mistaken for biological humans until more closely observed.

AI Core

This core type is only used in biosynth robots and is the most sophisticated computer processor core that current technology can create. Improving on the High Autonomous Core, an AI Core equipped robot can independently reason, derive conclusions or develop independent ideas that are not readily apparent when first explained to others.



FOREIGN NOBILITY



INTRODUCING OUR LATEST BIOSYNTH - GENERATIONS BEYOND THE COMPETITION

AVATAR BIOSYNTH V2.7

ONLY AVAILABLE AT LEADING 'A+ CLASS' FACILITIES ACROSS CLEMENT SECTOR:: LICENSE APPROVAL MAY BE REQUIRED 

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

The AI Core provides the robot with true artificial intelligence along with very sophisticated emotion emulation routines to the extent that it will be mistaken for a sentient, even after a period of careful observation. An instruction to shut down is something this robot will certainly not want to be told. Truly curious with all the desire and ability to actively learn, through the gathering of information, observations and experiences, the robot can exhibit true creativity, acquired inspiration and experience a wide variety of understood feelings and emotions thus allowing a true personality to develop.

Specifically adapted for Type 3 Avatars, the Avatar AI Core data processor includes imprint matrix and synthlink hardware, allowing the Avatar to clone itself to the biosynth and upload those experiences back to the original at regular intervals or at a later date. Using quantum entanglement technology, treat synthlink hardware as having ten times the range of a microwave link but without the possibility of being jammed.

AI Cores are relatively rare. Brought to Clement Sector just before the Collapse event in 2331 and further developed in the intervening years, they are still only available in the most settled systems with the technology base and sophisticated manufacturing to produce them.

Core Data Processor Types

Type	TL	Power	Weight (Kg)	Storage	Cost (Cr)	DEX Mod	Base INT	Base EDU	Base SOC
Low Data Core	7	0.25	0.5	10	500	+0	0	4	0
High Data Core	9	0.25	0.5	10	2500	+1	4	5	1
Low Autonomous Core¹	10	0.25	0.3	20	6000	+2	5	6	3
High Autonomous Core¹	11	0.25	0.3	20	15,000	+2	6	8	4
AI Core¹	12	0.25	0.3	25	45,000	+3	8	10	6
Avatar AI Core²	12	0.30	0.4	25	60,000	+3	8	10	6

¹ Requires Full Command Interface

² Requires Full Command Interface and a Type 3 Ship's Avatar

Storage: Minimum storage space required

DEX Mod: Derived dexterity modifier

Base Attributes: Base attributes reflect the core data processor's level of sophistication

Core Command Interface

Manual Input

Instructions are provided to the robot via a keyboard or a similar tactile input device. Especially common in assembly line or other very specialized and, most often, immobile robots.

Limited Command

This interface provides a robot a command list of one hundred words. This is very rudimentary interface software where the speaker must enunciate command words carefully and precisely lest they be understood or ignored. An accent different to what is programmed will cause additional difficulties.

Basic Command

Allows the robot to understand simple sentence length commands rather than just a single command word. Though more sophisticated than a Limited Command Interface, more complex instructions or nested sentences will simply be misunderstood. The speaker must still enunciate command words carefully to avoid such misunderstandings. An accent different to what is programmed will cause still additional difficulties.

Full Command

This interface provides the robot with full ability to understand spoken sentences and provided instructions of any complexity. There are no issues with accents, pronunciations or slang.

Core Command Interface Types

Interface	TL	Modules Req.	Storage Req.	Cost (Cr)	Core Processor Requirement	INT Mod
Manual Input	7	1	1	300	Low Data	0
Limited Command	8	1	1	600	Low Data	0
Basic Command	9	2	2	1200	High Data	+1
Full Command	9	5	5	6000	Low Autonomous	+2

Core Data Storage

Core Data Storage is used by the robot to store additional Task Software and supplied or acquired data. It is recommended that storage is provided that is double the space of any required task software to allow for acquired data storage. The larger the storage provided the greater the increase to a robot's Derived Education.

Core Data Storage Types

Storage Type	TL	Power	Weight (Kg)	Storage Provided	Cost (Cr)
Standard	7	0.2	0.2	2	150
Advanced	8	0.2	0.2	2	200
Removable	8	0.2	0.2	2	300
Synaptic	10	0.1	0.1	3	5,000
Synaptic	12	0.1	0.1	4	10,000

Standard

Cheap but effective, the basic standard core data storage unit does limit a robot's stored program list and knowledge so requiring a lot of additional units to provide adequate storage. For every twelve units added a robot's Derived Education increases by +1.

Advanced

Faster and more capable, the advanced core data storage unit is an improved version of the standard core data storage unit. For every ten units added a robot's Derived Education increases by +1.

Removable

Removable storage allows data or programs to be swapped in and out as required. A robot could be provided new task software to undertake a different task or data it has acquired transferred to the removable storage and removed as needed. Removable storage can also be used for backup, protecting the robot's core software and data should it be badly damaged. Removable storage does not contribute to a robot's Derived Education and it has a much slower access speed with any task software suffering a -1 DM if loaded from it.

Synaptic

Much more expensive than either standard or advanced core data storage units, the synaptic core data storage unit provides the robot with the ability to improve with experience. Every four synaptic core storage units will add +1 to a robot's Derived Education and the robot has a chance to improve its education further (see page 76).

To reduce cost of storage a designer can elect to have a mix of synaptic core data storage and standard/advanced core data storage units.

Synaptic storage is the only core storage type available for biosynth.

Design example – 7. Computer

The *Clifford* needs to operate with a degree of independence and have the ability to think somewhat for itself, so a Low Autonomous Core Data Processor and Full Command Core Command Interface are chosen.

Low Autonomous = 0.3Kg, storage required 10, power 0.25, cost 6,000Cr

Full Command = storage required 5, cost 6,000Cr, +2 DEX

Low Autonomous provides base characteristics of +2 DEX, INT 5, EDU 6 and SOC 4

Low Autonomous = 10

Full command = 5

Total = 15

A Core/5 Core Module is chosen and an array of 7 modules provides active storage = 35 enough for necessary processor, command interface, core software and three task software programs.

8. Software Programs

Core Software

Core software is any task software that is required for the function of any critical component or for specific software that must always remain in active memory.

Emotion Emulator

This software allows the robot to appear to have emotions. When coupled with Facial Expression Capability then they also provide facial clues such as being happy, sad, angry, and so forth.

For some task software programs, the ability to show or express emotional responses is essential. Often, this task software will suffer a Very Difficult task difficulty modifier penalty (see Clement Sector: The Rules, page 19) when used.

AI Core equipped robots such as biosynths do not require Emotion Emulator Core Software.

Emotion Emulator software must be loaded into a Core Module Array at all times and requires space of 2 at a cost of 600Cr

Personality Pattern

Available for robots with an installed Autonomous Core, the Personality Pattern provides the robot with a defined personality which can be an important consideration depending on the robot's role. First available at TL 10 before the advent of AI Core, there are three types available for use.

Type	Storage	Cost (Cr)	Notes
1	5	10,000	Grumpy disposition
2	5	11,000	Dull with matter of fact attitude
3	5	12,000	Friendly and engaging +1 SOC

Required Task Software

Software required for locomotion/movement (except leg locomotion), built-in weapons or other critical components must have space provided within the Core Module Array of the robot. For a robot to move it must have the appropriate task software resident at all times.

Task Software

Core Data Processor subroutines include Expert software, so the robot is able to access task software. As Core Data Processors become more capable and sophisticated, then the higher the rating of task software that can be installed. Task software rating is equivalent to skill levels. The Expert Rating caps the proficiency level of any task software.

Expert Rating	Core Data Processor Type
1	Low Data Core
1	High Data Core
2	Low Autonomous Core
3	High Autonomous Core
4	AI Core
4	Avatar AI Core

Many task software packages require a minimum Core Processor type or Emotion Emulator software.

Like skills, some task software is cascade type and a specific specialty must be chosen.

Higher rated task software can be purchased or increased by experience (if the robot is sufficiently sophisticated). Each purchased increase in software rating will increase storage space and cost by 1.5x the original software rating rounded up.

For example, the designer elects to provide Engineer (M-Drive)/2 to an engineering-bot. This means the higher rated software will require storage of 6 and a cost of 750Cr. If the designer elects to increase the robot's skill to Engineer (M-Drive)/3 the storage requirement would be 9 and the cost increases to 1125Cr.

The rated amount of task software uploaded into a robot's computer must not exceed the sum of their Derived Intelligence and Derived Education.

For task software descriptions, refer to Clement Sector: The Rules, page 45.

Task Framework Software

High Autonomous and AI Core robots can also have framework software added so to better compliment the task software already installed and provide a guide path for the robot to skill improve. Usually these will be related skills that the designer wishes the robot to "grow into". A robot can only have two level zero (task software/0) installed and must have enough data storage provided to allow for the robot to learn the skill.

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Task Software List

Task Software	Storage	Cost (Cr)	Notes
Admin	4	400	
Advocate	5	800	Requires Emotion Emulator
Animals	4	400	
Athletics	4	400	
Art	5	1200	Requires Emotion Emulator
Astrogation	4	500	
Broker	4	400	Requires Emotion Emulator
Cargo Handling	2	300	
Carouse	4	400	Requires Emotion Emulator
Combat Engineering	4	500	
Deception	5	500	Requires Emotion Emulator
Diplomat	5	1000	Requires Emotion Emulator
Drive	1	300	
Electronics	4	400	
Engineer	4	500	
Explosives	2	400	
Firefighting and Rescue	4	400	
Flyer	4	400	
Gambler	4	500	Requires Emotion Emulator
Ground Combat	3	400	
Gunner	2	400	
Gun Combat	2	400	
Heavy Weapons	2	500	
Instruction	5	800	Requires Emotion Emulator
Interrogation	4	500	Requires Emotion Emulator
Investigate	4	400	
Jack of All trades	5	1500	Requires Emotion Emulator
Janitor	2	200	
Language	5	600	
Leadership	4	600	Requires Emotion Emulator
Mechanic	2	400	
Medic	5	500	
Melee	3	400	
Naval Architect	4	600	
Navigation	4	500	
Persuade	4	800	Requires Emotion Emulator
Pilot	4	500	
Recon	2	300	
Recruiting	5	800	
Science	5	600	
Seafarer	4	400	
Security	2	200	
Stealth	2	300	
Steward	2	250	Requires Emotion Emulator
Streetwise	4	600	Requires Emotion Emulator
Survival	1	200	
Tactics	5	800	
Trade	5	500	
Valet	2	250	Requires Emotion Emulator
Vacc Suit	1	100	
Weapons Engineering	4	500	
Zero-G	4	400	

Additional Task Software Descriptions

Cargo Handling

Permits the robot to load and unload cargo from any variety of vehicles and spacecraft. This task software requires the robot to have at least two medium or greater standard arms.

Firefighting and Rescue

This task software allows the robot to battle all forms of fire incidents, rescue disaster victims and to provide basic first aid equivalent to Medic (First Aid)/O. The robot requires one light and one medium standard arm.

Ground Combat

Ground combat task software provide the robot with the basics of ground combat. Ground Combat task software is similar to a cascade skill and a specific specialty must be chosen.

Specialties:

- **Infantry**

This task software provides specific though basic skills allowing the robot to act as an infantryman.

- **Armored**

This task software provides specific though basic skills allowing the robot to understand armored and vehicle combat. The robot must have leg locomotion, two standard light arms and have additional vehicle task software installed for the vehicles it is intended to utilize.

Janitor

Provides the robot with the ability to clean, dust, wash polish and tidy designated areas such as residences or office spaces.

Security

Security task software must be included in any robot designed to perform security duties. Security is similar to a cascade skill and a specific specialty must be chosen.

Specialties:

- **Minimum Security**

This task software allows the robot to act as a security guard for installations requiring minimum security. The robot will patrol a specified area at irregular intervals, report any break-ins, unauthorized persons or events such as fires. A carried weapon and enhanced sensors are not required but would be beneficial.

- **Medium Security**

As minimum security, however the robot will seek to detain any unauthorized personnel entering a specified area, usually an assigned patrol zone. A carried weapon and enhanced sensors are required.

- **Maximum Security**

As medium security, although the robot is authorized to fire on any unauthorized personnel entering a specified area. A carried weapon and enhanced sensors are required.

Valet

This task software provides the robot with the ability to act as a body servant. Laying out clothes, preparing food and drinks, running errands etc. Valet Robots must use a contoured chassis of human shape.

Applications

An application, or 'App', is a small, self-contained software program that's designed to perform a specific function directly for a robot or, in some cases, for another task application. Taking up less storage, they are designed to be added and replaced as needed during regular maintenance periods.

Apps are typically written for three specific areas: Reference, Utilities, or Programmed Actions. The list below provides a range of popular examples and serves as a guide for the referee to create their own based on their campaign and players.

Each App takes up 0.25 storage space and costs 150 Credits.

Reference

App Name	Description
Bierglas	The penultimate list of every beer and their characteristics available in Clement Sector.
CocktailShaker	The penultimate list of every cocktail recipe known to humanity.
Doctor Erin's Handy Weapons Reference Guide	A handy all in one guide to popular weapons found across the sector.
Jimmie's 20 Minute Meals	Guaranteed pukka meals for your passengers with streaming narration and video.
Jimmie's Exotic Meals of Sequoyah	Delightful, spicy, and filling meals from across the Sequoyah region, with streaming narration and video.
Mapfinder	Get the best maps for your local area/planet.
Mediguide	A visual and audible guide to every known disease or illness in the sector.
Moviepedia	Comprehensive guide to all the movies ever made.
Steadman's Vehicle Breakdowns	A comprehensive reference guide to many of the popular vehicles used throughout the sector.
Superpirate! Trivia	Episode lists, cast, guest stars, interviews, quotes, and reviews of the most popular entertainment show in Clement Sector. The most comprehensive show guide available. Allows the robot to insert <i>Superpirate!</i> quotes into their conversations.
Wattsup	An extensive collection of retro and popular games, with selections for play between groups of passengers, crew or small groups of people.
Winexpert	Provides a steward robot with additional but comprehensive information about wines throughout Clement Sector
Wendy's Guide to the Ships of Clement Sector	A handy reference of all the Wendy's ship reference manuals
Yolanda's Children's Library	A huge multicultural collection of nursery rhymes, fairy tales and children's songs. With animations and music.

Utilities

App Name	Description
Beetzer	Music Player & Streaming – why have a quiet robot when you can use it to stream your favorite music tracks. Comes preinstalled with a legal copy of the entire 'Ducks of Death' back-catalogue.
Wordslayer	A handy library of obscure poetry with built in narration feature.
Mapfinder	Get the best maps for your local area/planet.
Starfinder	A somewhat accurate stellar location finder app. If your transition has failed, use the app to lock on to visible constellations and pinpoint your exact location.
ShoppingStuff	Helps you find the local dealer or trader for a specified product.
Barfinder	Locate seedy spacer bars to get the latest patrons, rumors or cargo deals.
GroceryNow!	Order groceries and victuals for your ship direct from your robot, no need to spend time walking to the starport mall or using your personal computer or workstation.
Netbreach	Find any holes in your shipboard or office network, and help your friends find holes in theirs.
Cagney's Cargoman	Use personalized recommendations based on your profile to locate cargo and trading goods.
Better Battery Optimizer	Further optimizes power usage for even more components and sub components, providing up to an additional 30% longer uptime.

Actions

App Name	Description
BotRacer	Allows the robot to attempt an impressive or dangerous maneuver (with effective driving/flyer task software of 2) for one round. Appropriate task software required.
Chauffer	Provides the robot with enhanced etiquette skills when acting as a driver.
Chemlab	Allows the robot to accurately determine the chemical composition of a rock, mineral, item. Requires appropriate sensors.
Gray's Hackar	Allows a bonus modifier in attempting to crack a network or computer security.
Gray's Optiroute	Allows the robot to find the fastest local data or comms feed whether it is secure or not, though any unsecured route will be flagged.
Gray's Short-circuit	Allows the robot to discharge a short burst of stored energy from their hand or recharge probe (reduce battery duration by 20%).
Gunman: AccuraPrime	Provides the robot with a modifier when lobbing or firing grenade weapons to accurately determine the optimal drop location.
Gunman: Holsterplay	Provides the robot with an extensive repertoire of impressive gun-handling tricks or handling displays for holstered weapons.
Gunman: Multi-target	Accurate aimed fire at multiple targets (effective as Gun Combat/2) for one round only, then the App needs to reset for 6 rounds.
Mediguide: First Responder Add-on	Extra guide to the base App allowing emergency response to critical injuries (effective as Medic/2 for gunshot or severe trauma injury). Requires the Reference App – Mediguide.
Mediguide: Wound Add-on	Extra guide to the base App allowing treatment of specific injuries (effective as Medic/2 for a very specific injury). Requires the Reference App - Mediguide. Other injuries or more types than gunshot require additional apps.
Newsfinder	Find news on local networks based on specific criteria (functions as Investigate/0).
Planman	Allows the robot to draw accurate architectural or deck plan guides based on scanned images, photographs, or ocular sensor capture.
Routefinder	Finds the most effective travel route upon a planet, based on your vehicle selection and location. Requires an internal/carried internal personal comm or a wireless/microwave link.
Wrencher	Allows the robot to tighten or loosen an item to a required pressure amount.

Design example – 7. & 8. Core Software, Storage and Task software

As the *Clifford* is a service robot working with a variety of humans it requires Emotion Emulation software. A cheerful disposition is also a bonus so Personality Pattern type 3 is chosen. This provides +1 Soc

Core Software:

Emotion Emulation, storage required 2, cost 600Cr

Personality Pattern 3, storage required 5, cost 12,000Cr

Task Software:

Steward/2, Admin/1, Flyer (Grav)/1 Drive (Wheeled)/1 = 6 + 4 + 4 + 1 = 15 storage at a cost of 1,475Cr

Synaptic Storage TL 10 = 2x (power 0.2, weight 0.4kg, cost 10,000Cr) = 6 storage

Advanced Storage = 12x (power 2.4, weight 2.4kg, cost 2,400Cr) = 24 storage

9. Sensors, Communications and Electronics

A variety of different types of sensors can be provided to a robot depending on use, cost and requirement. Sensors, communications equipment and other electronic components use internal space unless otherwise noted.

Most manufacturing companies offer a standard sensor package that includes 2x optical, 2x audio and 1x olfactory sensors.

Type	TL	Power	Weight (Kg)	Price (Cr)
Standard Sensor Package	8	2.5	0.6	1500

Optical

Standard

Standard optical sensors provide the robot with human equivalent vision. Like humans, it is best that optical sensors are paired to provide suitable depth perception. Standard optical sensors can be designed to look like human eyes or any other species the robot might be shaped like.

Advanced

An Advanced sensor package combines Standard optical sensors with additional infrared, ultraviolet and night vision optical sensors. Advanced optical sensors can be designed to look like human eyes or any other species the robot might be shaped like.

- Infrared allow perception of radiated heat. These are passive sensors.
- Ultraviolet allows perception of ultraviolet light
- Night Vision magnifies the smallest amount of available light so that this optical sensor can see in darkness as well as daylight.

Zoom

Zoom provides long distance capability to an optical sensor, allowing magnification of 10x. For even longer distances additional sensors can be added to a limit of 100x.

Micro

Similar to zoom, Micro enables an optical sensor the ability to enlarge very small objects visually. A single sensor can enlarge up to 100x with any additional Micro sensors increasing that magnification to 1000x.

Encompassing

Encompassing sensors provide the robot with full 360-degree vision. These sensors are positioned at four equidistant points along with sensors that can view up and down, providing the robot with full spherical vision. Military scoutbots or securitybots equipped with anti-grav are often equipped with this type of optics. Encompassing sensors can be either Standard or Advanced type and can be additionally fitted with enhanced optics such as Zoom. Cost is multiplied by 6x (1x per each sensor).

Biosynth Eye

Perfect replicas that exactly mimic the actions of human eyes (or whatever eye type is required). The pupils react to differing light levels and they can produce tears depending on emotion.

Polarizing Shield

Designed to polarize in sudden bright changes of light, Polarizing Shields protect optics from damage. They can be added to Standard optics or added to night vision equipped Advanced optical sensors.

Optical Sensor Types

Sensor Type	TL	Power	Weight (Kg)	Price (Cr)
Standard	5	0.5	0.1	100
Advanced	7	0.5	0.3	500
Zoom	7	0.5	0.1	200
Micro	7	0.5	0.15	500
Night Vision	7	0.5	1	200
Encompassing	5	6x	6x	6x
Biosynth Eye	12	0.5	-	6000
Polarizing Shield	7	0.2	0.1	200

Audio

Standard

Standard audio sensors provide the robot with human equivalent sound reception. Like humans, it is best that audio sensors are paired to provide suitable spatial perception.

Advanced

An Advanced sensor package combines Standard audio sensors with additional infrasonic, ultrasonic and noise filtering audio sensors.

- Infrasonic allow the perception of very low sound frequencies
- Ultrasonic allow the perception of very high sound frequencies
- Noise Filtering allows the isolation and extraction of individual sounds by filtering out background and other extraneous noises.

Ultrafine

Providing far more audio sensitivity, Ultrafine sensors allow for picking up the faintest sounds at all levels of atmospheric pressure.

Soundburst Shield

Similar in concept to Polarizing Shields, Soundburst Shields protect audio sensors from damage. They can be added to Standard audio sensors or added to Ultrafine equipped Advanced audio sensors.

Audio Sensor Types

Type	TL	Power	Weight (Kg)	Price (Cr)
Standard	5	0.5	0.1	50
Advanced	8	0.5	0.3	700
Noise Filter	8	0.5	0.1	600
Ultrafine	8	0.5	0.1	500
Soundburst Shield	8	0.2	0.1	200

Olfactory

Standard

Standard olfactory sensors provide the robot with human equivalent ability to smell.

Advanced

Advanced olfactory sensors double the sensitivity of Standard olfactory sensors, providing a +2 DM to locating or identifying what is causing that particular smell.

Olfactory Sensor Types

Type	TL	Power	Weight (Kg)	Price (Cr)
Standard	8	0.5	0.2	1200
Advanced	9	0.5	0.2	10,000

Touch

Touch sensors can be added to a robot to provide additional sensitivity or to provide further ability to mimic a human or the creature it is patterned after. All standard arms have basic touch sensors installed as standard. Biosynths already have Standard haptic sensors included in the chassis price and if required these can be upgraded.

Standard

Standard haptic (touch) sensors provide the robot with human equivalent touch sensitivity. Power requirements, weight and cost of Standard haptic sensors for a chassis size can be calculated using the values in table below.

Advanced

Additional haptic (touch) sensors provide the robot with much more refined touch sensitivity allowing a +2 DM on all touch determination roles. Power requirements, weight and cost of Advanced haptic sensors for a chassis size can be calculated using the values in table below.

Touch Sensor Types

Type	TL	Power	Weight (Kg)	Price (Cr)
Standard	8	0.02x chassis weight	0.05x chassis weight	50x chassis weight
Advanced	10	0.02x chassis weight	0.05x chassis weight	100x chassis weight

Taste

Standard

Standard taste sensors provide the robot with human equivalent taste ability.

Advanced

Advanced taste sensors provide the robot with far more sensitive sensors enabling identification of all components that make up the item being tasted. For instance, a meal can be analyzed and all the ingredients no matter how small can be determined. Identification tasks gain a +2 DM.

Taste Sensor Types

Type	TL	Power	Weight (Kg)	Price (Cr)
Standard	8	0.5	0.5	1800
Advanced	9	0.5	1	10,000

Other Sensors

Bioscanner

Bioscan sensors detect airborne pathogens and hazardous chemicals.

Densitometer

An outgrowth of gravitic technology, a densitometer can scan an area and plot variable densities, effectively creating a three-dimensional map of all objects.

Electromagnetic Detector

Electromagnetic Detectors are sensors that can detect unshielded high-power electrical devices such as gauss weapons or transmitters.

Neural Activity Sensors (NAS)

A collection of highly sensitive EM detectors, Neural Activity Sensors can pick up brain activity of living beings and classify them according to amount and complexity thus giving a rough idea of the intelligence of subjects.

Radar

Using radio waves to detect electrically conductive targets that would otherwise not be able to be detected due to poor visibility, distance or atmospheric conditions. Radar detects object distance, speed and object mass. Like radar installed in other vehicles and spacecraft, radar operates in either passive or active mode. Each mode consumes different amounts of power and has different ranges. Passive can detect objects up to 5km distance while active radar expands that range to 50km. Active radar however will broadcast the position of the robot to outside sources.

Sonar

Similar to radar, sonar uses sound waves rather than radio waves to undertake detection of conductive and non-conductive objects. Sonar can only function underwater or in sufficiently dense atmospheres. Sonar's passive range is 1km extending to 3m when actively used. Active sonar however will broadcast the position of the robot to outside sources.

Miscellaneous Sensor Types

Types	TL	Power	Weight (Kg)	Price (Cr)
Bioscanner	9	1	5	250,000
Densitometer	11	1	5	30,000
Electromagnetic	8	1	2	2500
NAS	12	3	8	60,000
Radar	7	1/2*	2	2500
Sonar	7	1/2*	2	2500

* Passive/active modes

Communications

Various communication components are available for installation into a robot. These are described in this section.

Comm (Personal)

Identical to standard personal communicators available throughout Clement Sector, this can be built into the robot as required. It is a single channel device capable of linking with the planetary satellite network and can communicate with any other communication device on that world. It is a private channel but is not secure. For a small fee network access can be purchased at any starport or within settlements on the planet.

Keyboard

Keyboards have remained unchanged since the late nineteenth century. This is a standard virtual keyboard used throughout Clement Sector.

Holoprojector

A holoprojector allows the robot to virtually replay recordings. See **Clement Sector: The Rules** (CS:R), p. 57-58 for details.

Laser Communications

Laser communication enables secure communication without the aid of an external network. There must be line of sight between the transceivers however. These can be upgraded to Maser communicators at 1.5x cost, power and weight. Maser communicators can cut through smoke and aerosols.

Microwave Link

Allows for very secure data and control linkages up to 5km or further if relayed.

Radio Communications

Radio allows for communications as long as the radio signal is not blocked by weather conditions or jammed.

Speaker

A speaker allows the robot to project sound such as a human voice. However, the voice will sound very artificial compared to a vocoder.

Vocoder

Used by robots to create and express human languages (or other creature sounds) the vocoder provides a perfect mimic of human speech and sounds in all its forms (including singing). Biosynth vocoders are simply smaller with a more refined and greater vocal range.

Wireless Link

Allows for secured data and control linkages up to 150m or double that distance if relayed. Wireless Links are less secure than Microwave Links, but still difficult to hack.

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Type	TL	Power	Weight (Kg)	Cost (Cr)	Notes
Comm (Personal)	8	0.25	0.2	250	
Keyboard	8	0.1	0.1	10	For manual input of commands
Holoprojector	9	1	1	1000	
Holoprojector	10	1	1	10,000	
Laser Class I	9	1	1.5	1000	Regional (500km)
Laser Class II	11	1	0.5	2500	Regional (500km)
Laser Class III	13	0.5	0.5	5000	Regional (500km)
Microwave Link	7	0.5	0.5	200	5km range
Radio Class I	5	0.5	0.1	500	Distant (5km)
Radio Class II	5	1	0.3	1000	Very Distant (50km)
Radio Class III	6	1	0.8	2000	Regional (500km)
Radio Class IV	8	1	1.8	4000	Continental (5000km)
Speaker	5	0.5	0.6	100	
Vocoder	6	0.5	0.5	300	
Vocoder (Biosynth)	12	0.5	0.5	2000	
Wireless Link	7	0.5	0.2	50	150m range

Other Electronics

Data Port

This is a data port which provides the robot with the means to upload or download data via portable memory devices or by wired network cable.

ECM and Advanced ECM

This component allows the robot to counter low power jamming and passive radio homing weapons. Advanced ECM counters high powered jamming and active radio homing.

Holographic Recorder

Often referred to as a holorecorder or even as a holocorder, the holographic recorder is used by the robot to record visual data in 3D. A TL10 recorder is far more sophisticated and able to record true-to-life images. A holographic projector can be used to play back any recordings.

Video display, Recorder and Projector

A camera able to record activities in 2D, storing the recordings digitally in the robot's core data storage so to be played back later if required. This can be streamed or cast directly to a video display of any type or can be projected to any appropriate surface much like a twentieth – twenty first century movie cinema projector.

A video display can also be used in lieu of Facial Expression Capability. However, unlike facial expression capability a video display provides no benefits to either appearance or social standing. It does however reduce any negative reactions to the robot when interaction takes place.

Type	TL	Power	Weight (Kg)	Cost (Cr)	Notes
Data Port	7	0.25	0.15	150	
ECM	7	1	2	5000	Counters low powered jamming
ECM (Advanced)	7	2	4	18,000	Counters high powered jamming
Holorecorder	9	0.5	1	2000	
Holorecorder	10	0.5	1	18,000	
Video Display	7	0.2/0.4/0.6	0.5/0.75/1	100/200/300	OLED
Video Projector	7	0.5	3	200	
Video Recorder	7	0.5	0.5	300	

Storage Space

Remaining space can be assigned to use as a storage compartment or cargo space depending on requirements.

Design example – 9. Sensors, Communicators and Electronics

Clifford needs to be able to perceive the outside world and to interact with it so to undertake assigned tasks.

Sensors

Standard sensors package (2x optical, 2x audio & 1x olfactory): Power 2.5, weight 0.6kg costing 1,500Cr

Polarising Shield: Power 0.2, weight 0.1kg and costs 200Cr

Taste: Power 0.5, weight 0.5kg and cost 1,800Cr

Electronics

Personal Comm: Power 0.25, weight 0.2kg and costs 250Cr

Vocoder: Power 0.5, weight 0.5kg and costs 300cr

Holo Projector: Power 0.5, weight 1kg and costs 1,000Cr

Holo Recorder: Power 0.5, weight 1kg and costs 2,000Cr

All sensors, vocoder and the holo projector/recorder are located in the head.

10. Other Components

Auto Repair

An auto repair system is only available for the latest generation robots. If so equipped, a robot will self-repair one inoperable hit point per hour. A biosynth must have this system installed.

Bio-organic Processor

These artificial digestive systems provide an additional power point per 4000Kj of food (any organic matter will do – but a socialized robot does eat politely!) consumed. Waste is processed and purified as necessary. Fluids are purified and are then lost via evaporation processes. Bio-organic processors are standard in a biosynth but must be included in internal space calculations.

Breathing Emulator

Contoured robots can have breathing emulators installed to further mimic the creature they are mimicking. This even extends to canine panting if the robot is a dog. Biosynths must include this component.

Sample Compartment

An enclosed compartment of nominal size that can be accessed by the robot to deposit samples or specimens. A sterile version is available if required. Testing devices and sensors can be added to either type, tripling the cost further adding 1kg to the required size of the compartment and requiring 0.25 Power.

Scent Generator

A robot equipped with this device can recreate different scents. This also includes Pheromones. The generator can provide a scent to a volume of 60 cubic meters.

Sexual Organs

These replicate male and female sexual organs of humans or non-human uplifts. For robots with less than a High Autonomous Core, sensations created by sex organs are programmed. If the Core Data Processor is at least High Autonomous, then haptic sex organs will provide the robot with true sensations. Male sexual organs add to external weight while female sexual organs reduce internal space. Biosynths have haptic sexual organs included but consideration must be given to inclusion in the total power requirements.

Smoke Discharger

Similar in effect to a smoke grenade, the smoke discharger creates a sight blocking and laser-blocking defensive barrier. See Clement Sector: The Rules, page 70 for details.

Spotlight

This can illuminate out to a distance of 100m. Large spotlights illuminate up to 200m and turn lesser distances into day.

Type	TL	Power	Weight (Kg)	Cost (Cr)	Notes
Auto Repair	12	0.25	-	25,000	Repairs one point per hour
Bio-organic Processor	10	0.4	3 ¹	5500	Required for biosynths
Breathing Emulator	8	0.3	1 ¹	500	Emulates breathing
Sample Compartment	8	-	Varies	50/kg	
Sample Compartment Sterile	8	0.2	Varies	80/kg	
Scent Generator	8	0.5	2 ¹	600	
Sexual Organs	9	0.2	0.2 ¹	2500	
Sexual Organs (haptic)	9	0.25	0.25 ²	3500	Included on biosynths
Smoke Discharger	7	0.2	5 ¹	150	
Spotlight (small)	5	1	1	50	
Spotlight (medium)	5	5	10	100	
Spotlight (large)	5	15	20	150	

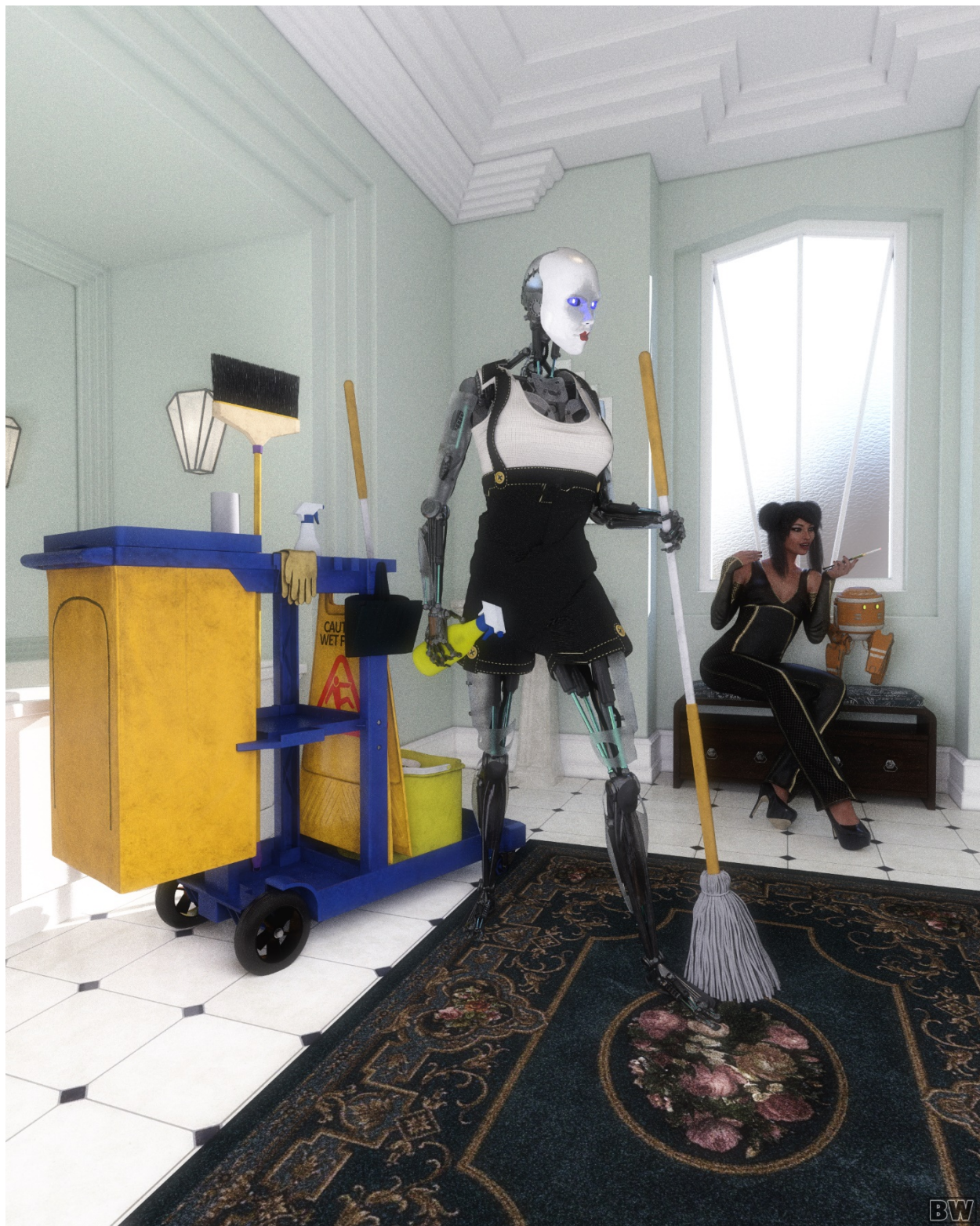
¹ Internal Space

² See description

Tool Packages

All the packages in the table below equip the robot with multiple tools required for that specific task. Equipping the robot arms with multi-tool sockets will allow the robot to change tasks simply by changing the tool package providing they have the required task software. All tool packages and miscellaneous equipment add to the overall weight and do not reduce internal space of the robot.

Type	TL	Power	Weight (Kg)	Cost (Cr)	Notes
Animal Husbandry	7	4	10	2500	
Carpentry	7	10	30	2500	
Electronic	7	4	8	5000	
Engineer	7	4	10	5000	Based on task software
Forensic	7	5	10	3000	Based on task software
Horticultural/Farming	7	5	10	3000	
Janitorial (Commercial)	7	4	12	3500	
Janitorial (Domestic)	7	3	5	2500	
Mechanical	7	4	10	3000	
Medical Instrument	8	5	15	8000	
Metalwork	7	10	40	4000	
Science	7	5	15	3000	Based on task software
Survey	7	5	15	3000	



BW

Miscellaneous Equipment

Assembly

These are specific external tool packages designed for assembly line robots undertaking tasks from microscopic assembly work to the construction of massive objects such as starships.

Cargo Lifter

These provide a cargo robot with forklift style lifters so to be able to lift and move cargo out of cargo holds of spacecraft and planetary surface transports.

Laser Welder and Cutter

Used by robots engaged in construction work

Plasma Cutter

Used by robots engaged in construction work

Type	TL	Power	Weight (Kg)	Cost (Cr)	Notes
Assembly (micro)	7	5	20	50,000	
Assembly (macro)	6	15	50	10,000	
Assembly (heavy)	6	25	100	20,000	
Assembly (very heavy)	6	40	500	30,000	
Assembly (massive)	6	120	2000	60,000	
Cargo Lifter (Light)	6	5	100	1000	Can lift up to 200kg
Cargo Lifter (Medium)	6	15	200	2000	Can lift up to 500kg
Cargo Lifter (Heavy)	6	30	300	5000	Can lift up to 1000kg
Laser Welder (light)	7	5	10	1500	
Laser Welder (heavy)	7	10	20	5000	
Laser Cutter (fine)	7	5	10	1800	
Laser Cutter (high powered)	7	10	20	5500	
Plasma Cutter (fine)	7	5	15	2500	
Plasma Cutter (high powered)	7	10	25	8000	

Cargo Capacity

A robot can carry cargo or goods internally or externally simply by allocating sufficient space. If cargo is to be carried externally then the amount of carried cargo must be added to the locomotion weight calculation. Cargo carried internally affects any internal space calculations.

11. Calculating Derived Characteristics

Derived characteristics for robots are comparable to that of player characters and can be determined using the formulas on this page. Keep in mind that a robot does not have an endurance characteristic like a biological. Rather, a robot's endurance is measured by the length of time provided by the design duration of its on-board power. Without being hindered a robot can function right to the moment its power fails though, as described on page 25, it can adjust its power output to prolong that duration as required. Some robots also require a period of rest every standard day.

Derived Strength

Robots can be immensely strong compared to humans. This strength however allows larger robots to undertake loading and unloading of cargo, undertake heavy construction work and other similar tasks.

Strength = Chassis base strength + arm strength modifiers

Derived Dexterity

Dexterity = arm and hand dexterity modifiers + locomotion dexterity modifier + core data processor

Derived Intelligence

Intelligence = core data processor base INT + core module modifier + core command interface

Derived Education

Education = core data processor base EDU + core data storage modifiers

Derived Social

The characteristic of Social for robots is the maximum allowable social standing that the robot will have when in a society that freely tolerates them. Slaren or Talca in Cascadia subsector are both among the most permissive system societies for example, while Kingston, for religious reasons, considers robots of all but the most rudimentary nature an abomination.

A robot's Social is required to be appropriately adjusted to reflect the tolerance and attitude of the system's society that the robot is present within. This is especially important if a player is roleplaying that robot as a player character.

Social = core data processor base SOC + personality pattern modifier + appearance modifier + facial expression capability

12. Improving Derived Education

Providing the robot has synaptic storage and has at least an autonomous core data processor it can learn with experience.

For every ten synaptic core data storage units installed it has an extra characteristic point (rounded up to nearest whole number) it can use to improve its education. This calculated value of education potential can be listed next to the derived education in parenthesis or listed next to memory type.

It cannot however exceed the inbuilt core data processor Expert software's rating for any task software rating.

For example, an AI core robot has 50 synaptic data storage units installed. It has an available $50/10 = 5$ education characteristic points to use as it seeks to expand its education.

A robot must roll 10+ to add one level to its derived education. The following DM's can be used.

INT	DM
5+	+1
10+	+2
15+	+3

Roll 4d6 to determine how many months it will take to make the improvement.

Alternatively, if the robot is a player character the advancement System in Clement Sector Core Setting Book, page 197 can be used.

13. Hit Point Determination

A robot will take damage to the point that it becomes non-functional. Further damage taken will eventually destroy the robot entirely. These two groups of hit points are called Inoperable Hit Points and Destroyed Hit Points.

These are displayed as: Inoperable Hit Points/Destroyed Hit Points

Once a robot has exhausted its Inoperable Hit Points, it can no longer function. It cannot move or take any actions. Any further hits are then applied to the Destroyed Hit Points total. If these further damage points deplete the number of Destroyed Hit Points, then the robot has been destroyed.

To determine the value for each hit point group, use the following formulas. All results are rounded up.

Inoperable Hit Points = Chassis Weight/4 + Reinforcement

Destroyed Hit Points = Chassis Weight/2 + Frame Strengthening

Any armor installed (or worn) will, of course, provide additional protection to the robot.

For example, a security robot with hit points of 13/26 takes 9 points of damage from a shotgun fired by an intruder. Having previously taken 8 points of damage that had reduced its hit points to 4/26, the additional damage reduces the inoperable hit point total to zero rendering it non-functional. The remaining 5 points of damage from that second hit further damages the robot making its hit points to now be 0/21. Now unable to move or function, a third shot from an auto pistol causes an additional 7 points that further damages the robot. This leaves only 14 hit points remaining before it is totally destroyed.

Design example – 11. Characteristics and Hit Points

Clifford has been designed it is ready to be constructed. The final step is to sum up derived characteristics and hit points. It costs 156,696Cr and weighs 83.15Kg.

Derived Characteristics

STR = chassis mod + arm mod = 3 + (3 = 3) = 9

DEX = base (core data processor) + arm mod + locomotion mod = 2 + 4 + 4 = 10

INT = base (core data processor) + core module mod + command interface mod = 5 + 1 + 2 = 8

EDU = base (core data processor) + core data storage mod = 6 + 1 = 7

SOC = base (core data processor) + personality pattern type 3 mod = 3 + 1 = 4

Hit Points

Inoperable = chassis weight/4 = 50/4 = 13

Destroyed = chassis weight/2 = 50/2 = 25

Maintenance of Robots

Like every complex machine, robots need a regular maintenance program to replace worn or failing components and make adjustments to those components requiring such. The maintenance program will also include software and data maintenance.

Regular maintenance will cost 1% of the cost of the robot annually and can be undertaken by someone with robotics skill or at a specialized facility.

Life Span

Properly maintained a robot can provide full function for many years with life span increasing as technology improves.

TL	Life Span (Years)
8	30
9	70
10	90
11	140*
12	180*
13	220*

* multiply by 1.1 for a biosynth

Purchasing a Robot

The purchase cost of a robot will vary depending on size, type, complexity and function. For players wishing to purchase a robot for use in the game and do not have the necessary savings to make that purchase then they can apply for a standard loan with terms up to twenty-five years. The interest rate will need to be determined by the Referee as it will vary depending on markets and the system in which the player character makes the purchase.

Robots can be purchased pre-owned, direct from the manufacturer or from resellers. While buying a new robot does allow more customization to the player's requirements, it can be more expensive and take more time for delivery of the purchase. Most Asimov Group (see page 86) branches also offer "adoptions" of "orphaned" robots.

Additionally, what is available for the player to purchase will be determined by the location of that player's character.

Attitudes to Robots in Clement Sector

The assumption should be made that all of the systems in Clement Sector consider robots, no matter how sophisticated, to be simply tools to be used. Because they are considered tools, robots are provided little or no rights at all. Artificial Intelligence is mistrusted even to the point of being feared by citizens and governments of many star systems.

There are, however, exceptions and these are listed on the next few pages.

Hub Subsector

Totaro

A Japanese colony, Totaro shares the dislike of any form of AI due to the Bangkok Incident in the early 2100's. Unlike the Australians, with whom the Japanese were allied, this dislike has continued unabated to the present time. Non-AI Core robots in general are quite openly accepted by Totaran society, continuing a Japanese love of automatons three centuries old. Totaro is known widely as the destination where the best gynoid and android lovebots in Clement Sector can be found and experienced.

Kingston

Though the central cultural and religious belief system of Kingston greatly promotes the use of cyberware, all but the most basic robots are greatly disliked by all citizens. AI Core robots are singled out as being abominations under God and Calixi despite the fact that Caxton may very well have loaded himself as an AI.

Maximon

Maximon has little to no dislike of AI, quite unlike their neighbors and openly welcome AI robots into their society. AI Core robots enjoy equal rights to non-robot citizens while less sophisticated robots are protected from exploitation by law.

Hub Federation Member Systems

The Hub Federation as a whole has a quite open attitude to all robots. AI Core robots do have limited rights under Federation law including earning an income, but are not allowed to own property, vehicles and businesses or allowed to vote. All Robots are valued as workers though and despite non-AI Core robots not being paid an income they enjoy maintenance and update packages as part of their employment.

Cascadia Subsector

Cascadia

With a more relaxed view of artificial intelligence than most of the worlds of Cascadia Subsector, Cascadia allows for limited rights to be given to artificial intelligences including the right to vote in all elections and referendums and to own property. Robots are still required to be owned by a human, altrant, or uplift being still considered machines and, therefore, property. However there are several instances of AI Core biosynth robots being granted full citizenship with all the freedoms that entails.

Slaren

The Slaren Brewing Company sees all robots, including AI, as valuable workers with the same rights as uplifts, altrants, and humans employed as workers for the company. Several senior company executives and security force officers are AI Core robots.

Chance

Most casinos do not discriminate against robots being able to enter the casino, though they are monitored more closely than other patrons. However, the Razz is an exception and will not allow robots of any kind into the casino.

Dimme

AI is allowed but is most often crude and lesser tech, usually High Autonomous Core Processor equipped robots masquerading as AI Core. All “service” jobs (things which are not considered to be “hard work”) are done by robots. So, fast food workers, secretaries, low rank administrators, delivery drivers, etc. are usually robots. This allows the hard work to be done by “proper humans” who can be proud of a hard day's work.

Talca

The Technical Alliance of Talca is big on automation and artificial intelligence. There are approximately five robots per human on Talca. Most people have a personal assistant that is a robot and AI Core robots, though few in number, have the same rights as other citizens.

Yangon

The Emperor of Yangon, believing that robots are more trustworthy and loyal than humans, has made much of the Myint starport automated with robots. AI is present here as well.

Franklin Subsector

Bastiat

As home to the Foreign Nobility Corporation, AI is encouraged and seen as a modern wonder to be embraced by most of the city-states.

Sequoyah Subsector

Boone

Boone has a softer view of artificial intelligence than most of the worlds of Sequoyah Subsector. Boone allows for limited rights to be given to artificial intelligences including the right to vote and to own property. However, all robots are required to be owned by a human, altrant, or uplift. Robots are still considered machines and, therefore, property.

Harrison

Harrison, while highly distrustful of cyberware, is welcoming to AI and robots. Harrison believes that embracing the measured integration of robots into their society is a “sure fire” way to annoying Kingston, who hates robots and all AI.

The Colonies

New Perth

Like Totaro, the Australian colony of New Perth is generally distrustful of AI. Even though the Bangkok Incident created the negative attitude that most Australians have towards AI, the average Australian’s cultural belief in willing to “give it another go” has lessened that mistrust measurably over the last two hundred years. AI Core robots are becoming more common, though with appropriate oversight. Non-AI Core robots are used throughout the New Perth system and even more so in Boulder, New Perth’s mining colony. Robots have some rights enshrined into New Perth’s constitution and law system, but they cannot vote, own businesses or own land.

Osiris

Osiris, while welcoming in general to robots, will never allow them to purchase land.

Superior

While Superior will permit the use of low intelligence (up to Low Autonomous Core Processor) robots for industrial and entertainment purposes, artificial intelligence is forbidden. Superior believes in creating better humans and believes that artificial intelligence is the antithesis of their goals. Any AI found on the planet of Superior will be deported immediately.

Robots as Player Characters

Playing a robot as a player character can be challenging for a player but not onerous. A robot member of the group can add a number of advantages to the game but can cause others depending on which star system the player group arrives in, except Kingston – no one takes a robot to Kingston.

There are few systems in Clement Sector that will tolerate robots acting without some form of control. Furthermore, many systems will have different laws, societal and cultural views about a robot's freedom of movement.

A small number of systems allow robots to move freely and even allow them to have similar rights to humans, altrants and uplifts. However, most systems limit their freedom of movement by enforcing restricted areas or by restricting movement based on robot type. Other systems will also place availability prohibitions on robot type and sophistication of core data processor type.

In many systems it is to be noted that the robot's owner more often than not will be made automatically liable for any implied, intended or unintended actions of the robot. If those actions cause an accident, then this becomes the owner's fault, and they can be charged with such crimes as homicide even if they were not present. Further, any robot without an owner accompanying them will not be tolerated and will be seized for collection by the owner after that owner has paid damages and a large fine. If the robot is not collected within a certain time period it will be listed for deactivation or sale.

If that robot is a player character, then the situation simply gets much more complicated. Either the player roleplays the robot player character as being owned by another player's character or that the robot has falsified ownership papers indicating such ownership to those checking.

It is strongly recommended that any robot player character have at least a high autonomous core data processor, so it can have more sophisticated levels of independent thought and comprehension. Also, that the robot type be appropriate as playing a robot cargo lifter would severely limit any playability options the player might have. Any integrated or external mount weapons carried by a robot can also cause issues due to system law level and those weapons will need to be deactivated or removed if that robot is to leave the confines of the ship or starport. Failure to do so could lead to fines and robot deactivation or worse.

The player must roll against the following table to determine how old their robot character is and to determine any additional task software points that can be spent as the robot character improves that software rating through experience or has additional task software added.

Remember not to exceed the INT + EDU limits, storage or the Expert limit imposed by the Core Processor type. Reduce the experience point gain by 1 if the robot character has a low autonomous core data processor.

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

AI Core robots use a different system to determine their age, rolling 2d6-1 (minimum 1 year old) with 1 point gained towards task software improvement.

For fauxskin and biosynth human, uplift or altrant robots, the age is expressed the same way as any biological player character. This being chronological age followed by apparent age in parenthesis.

Roll 1d6 and check results in the table below.

Roll	Age	Points
1	Less than 2	-
2	2-5	-
3	5-15	1
4	15-25	1
5	25-35	2
6	35-45	2

Essentially all robots use logical thought processes and will analyze any situation it may be in to determine the best course of logical action by running a decision tree based on best probabilities. Only then will a decision be made. The less sophisticated the Core Processor the less options within that decision tree is determined and the more logical that decision will be. AI Core robots are able to make the least logical choices as they are able to imagine wilder and more complicated choices, so come very close to the decision-making tree that a biological human, altrant or uplift would make.

Aileia Sommer

STR 8 (+0) DEX 11 (+1) INT 16 (+3) EDU 17 (+3) SOC 10 (+1)

Age 6(27) Points 14/28
60 hours.

Surgeon Oberleutnant
Hub Federation Navy
Homeworld: Hub (Hub 0405)

Primary Language: German

AI Core Biosynth, Full Command
+4 EDU

Medic (Surgery)/3
Medic (Diagnosis)/2
Medic (First Aid)/1

Gun Combat (Slug Pistol)/1
Language (English)/1
Vacc Suit/1

Admin/0
Science (Biology)/0



Originally part of the Hub Federation Navy's engineering special projects division program that was evaluating biosynths as supplementary fleet and base personnel, Aileia is a type 2 (TL13) AI Core biosynth. Her conscious mind was activated in 2336 and Aileia was evaluated as a medical officer throughout the four-year program. After the program had been completed it was decided by BuPers to post the evaluation participants throughout the fleet and Aileia was assigned as Senior Medical Officer to *HFS Reisdorf* which was deployed to *HFN Falcon* in the Harrison System (Sequoyah 0805).

Aileia has an engaging personality and is a cheerful, very curious individual. Much loved by all the crew of the *Reisdorf* who are very protective of her, she is very good at her profession. If asked how she feels about being owned by the navy, her answering smile and her reply will always be both simple and direct. "Other officers of the fleet have careers and can be said to be owned by the navy. Well I have a career too."

Often seen in the wardroom directly after her duty period has finished drinking a high protein, high kilojoule chocolate orange shake - her favorite, she is always willing to have a chat with her crewmates.

It is obvious that someone that was part of the special projects division taught her a combat skill, but she will not tell anyone who that person was. She also has a wicked sense of humor and that, she evolved on her own.

ORGANIZATIONS



FOREIGNNOBILITY

Foreign Nobility Computers

Located in Bastiat in the Franklin Subsector, FN produces avatar interfaces for computers and has been heavily involved with the continuation of the avatar AI Core data processor and avatar biosynth development. For more information on FN, see 21 Organizations, page 21.

The Sanctity of Belief

This anti-robot and AI group primarily operates within the Hub and Sequoyah subsectors. Known to have Caxtonist roots and with strong evidence indicating it is funded by Kingston-based backers, The Sanctity of Belief is the extreme expression of the deep distaste of all artificial life according to Caxtonist religious teachings.

The trademark sword through a stylized robot head symbol is always painted near an area the group targets giving them the derogatory nickname “pointy heads” by popular media throughout the two subsectors, belying the seriousness of their actions.

Even with substantial information and strong evidence there has been little headway by the authorities in multiple star systems in finding this fanatical group’s leaders. By removing the leaders, it is hoped that The Sanctity of Belief will collapse. This is complicated greatly by the members of this order never being captured alive, preferring to martyr themselves to Calixi rather than being captured alive. Thus, authorities must rely on old fashioned and electronic intelligence.



Asimov Group

The Asimov Group was established in 2102 in Paris, France. Dedicated to the betterment of robots through colonized space, the Asimov Group opened its first Clement Sector office in Hub thirty years after the colony was first established.

AG's primary manifest is to agitate for the better treatment of all robots, pushing for more effective laws and regulations to provide robots more protection under the law and pushing for better rights and freedoms. AG strongly believes that any robot with the ability to think and learn must be allowed much more self-determination and basic freedoms.

To this end, the Group's lawyers also pursue those who abuse robots of any kind. Strangely, the Group does not consider assembly line type robots worthy of their attention insisting that they are simply production machines.

AG also has a political arm which pursues the group's equality and rights goals within system governments all over Clement Sector. Within the Hub Federation Senate, for instance, there are two Asimov group senators and in Cascadia the Asimov Group has been successful in placing a Congressman in the most recent Congressional Election.

AG also maintains half-way houses for robots that require aid or assistance. It is from there that owners can collect their wayward charges (for a fee of course), "day care" their robots if required or where interested parties can "adopt" one of the "orphans". Attached to these facilities are maintenance facilities that offer a less expensive service.

Asimov Group offer several levels of membership to their organization for a modest standard yearly fee. Memberships provide further discounts for robot maintenance and care, including legal advice and assistance should that member require such for their robot. Membership is also

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

provided free to any High Autonomous and AI Core robot which does lead to some interesting conundrums with various government organizations.

There are Asimov Group branches in almost every City in Clement Sector including strangely enough, one on the main orbital in the Kingston System.

Level	Annual Cost (Cr)
Basic	60
Standard	100
High	200
Executive	500
Self	Free

Pure Humanity

A small radical group determined to bring about the end of the use of robots, Pure Humanity consider any action, no matter how violent or destructive, as fully justified in their quest to purify humanity of the existence of all artificial life. They consider that all robots and artificial intelligences are abominations contrary to the perfection of nature and that humanity, as the highest representatives of natural order, must cleanse itself of the insidious disease it has created or become further debased.

It is believed that at least one member of the Pure Humanity leadership arrived in Clement Sector in the months just before the Collapse, possibly locating to Boone where most of the attacks have occurred. It is known that Pure Humanity evolved on earth in the United States but not enough is yet known of the group. Obviously, further information from authorities on Earth cannot be obtained through the collapsed Conduit.

In addition to the usual graffiti, defacing advertising signs, infohacking and leaflet drops the group will sabotage and destroy facilities or robots to further their aims. They have no compunction at all in causing non-robot worker deaths and injuries. It is common for members of Pure Humanity to publicly destroy a robot engaged in its tasked duties even if accompanied by its owner, who more often is not severely injured or killed as well.

Pure Humanity has been implicated in several high-level assassinations of officials favorable to allowing laws to be changed to provide more freedoms for robots and industry leaders who use high numbers of robots in construction and manufacturing.

Law and order agencies throughout Clement Sector have only been able to apprehend and successfully prosecute low ranking members of the group whilst more high-ranking members of the group remain hidden somewhere well away from authorities seeking them.

DESIGN EXAMPLES

RB2 Ship Maintenance Robot

One of a number of small maintenance robots available for purchase in Clement Sector, the RB2 has been designed to access constrained areas difficult for larger maintenance robots or human repair crew.

Cost = 26,728Cr

STR	DEX	INT	EDU	SOC
1	15	4	5	1

Hit Points 4/8

Rounded (Cylindrical) Chassis TL 12

Overall Weight = 25.16kg

Armor = Mesh

Batteries with charge port (60-minute recharge)

Duration = 8 hours

Arms = Standard (very light), retracting 2x hand and multi-tool socket

Locomotion = Legs 4x (10kph)

High Data Core, Limited Command

Core/5 Module 3x

Advanced Storage 5x (10)

Electronics (Electrical Repair)/1

Mechanic/1

Advanced Optical

Micro Optical

Standard audio

Vocoder



Cleaning Robot

This model is a basic commercial grade cleaning robot and is not suitable for use within a dwelling. It can undertake all cleaning operations and the long operational duration provided by its battery ensures that it can do all of that and more besides.

Cost = 72,390Cr

STR	DEX	INT	EDU	SOC
12	16	4	5	1

Hit Points 11/23

Rounded (Cylindrical) Chassis TL 10

Overall Weight = 78.31kg

Armor = Mesh

Head = All sensors, Vocoder & Comms

Batteries with charge port (60-minute recharge)

Duration = 24 hours

Arms = Standard (very light) 4x hand and multi-tool socket

Locomotion = Wheels 3x (10kph)

High Data Core, Limited Command

Core/5 Module 3x

Advanced Storage 5x (10)

Janitor/1

Drive (Wheels)/1

Advanced Optical

Micro Optical

Standard audio

Vocoder

Janitorial Tools

Scent Generator

Spotlight Small

Storage Compartment 2kg

Radio Class I (Distant 5km)



Clifford Model SRE-101 Service Robot

The Clifford SRE-101 service robot series is an upgrade of the very successful SRE-100 series developed by Wellington Robotics. Clifford was developed with spacecraft operators in mind, combining appropriate task software well suited for busy ship crews or catering to fussy passengers.

Cost = 156,696Cr

STR	DEX	INT	EDU	SOC
9	10	8	7	4

Hit Points 13/25

Contoured Chassis TL 12

Overall Weight = 83.15kg

Armor = Mesh

Head = All sensors, Vocoder & Holo-equipment

Batteries with charge port (60-minute recharge)

Duration = 38 hours

Arms = Standard (small) 2x

Locomotion = Legs 2x (10kph)

Low Autonomous Core, Full Command

Core/5 Module 7x

Synaptic Storage TL 10 2x (6)

Advanced Storage 12x (24)

Emotion Emulator

Personality Pattern type 3

Steward/2

Admin/1

Flyer (Grav)/1

Drive (Wheeled)/1

Standard Sensor Package (optical 2x, audio 2x, olfactory 1x)

Polarizing Shield

Taste Sensor (standard)

Vocoder

Personal Comm

Holoprojector and Recorder TL 9



Clifford SRE-101 Model Service Robot

Item	Type	Internal Space	Overall Weight	Cost (Cr)	Power	Storage	Str Mod	Dex Mod	Int Mod	Edu Mod	Soc Mod
Chassis	Contoured 50kg/40kg x1 weight, x2 Cost	40.00	50.00	4,000			3				
Armour	Mesh (included in chassis cost)										
Power	Batteries TL 12. 30 power, 2800Cr each, 40 hours	35.00		81,200							
	External Power Port - Charge type	0.26		65	0.3						
Arms	Standard Arms (small) 2x standard hands, contoured	12.00		3,000	8		6	4			
Head	Sensors/Comm/Vocoder, provision for moving	-5.00	5.00	400	1.3						
Locomotion	Legs (Pair) Speed 10kph, contoured	2.43	16.15	7,106	2			4			
Weapons	None										
Computer	Core Module	4.20		15,400	7				1		
	Core Data Processor	0.25		6,000		20		2	5	6	3
	Core Command Interface			6,000		5			2		
	Core Data Storage	0.20		10,000	0.2						
	Synaptic TL 10 2x (6 storage)	2.40		2,400	2.4					1	
Software	Emotion Emulator			600		2					
	Personality Pattern Type 3			12,000		5					1
	Steward/2			375		6					
	Admin/1			400		4					
	Flyer (Grav)/1			400		4					
	Drive (Wheeled)/1			300		1					
Sensors	Standard Package	0.60		1,500	2.5						
	Polarising Shield	0.10		200	0.2						
	Taste	0.50		1,800	0.5						
Electronics	Comm	0.20		250	0.3						
	Vocoder	0.50		300	0.5						
	Holo Projector	1.00		1,000	0.5						
	Holo Recorder	1.00		2,000	0.5						
Components											
Total		43.64	83.15	156,696	26	47	9	10	8	7	4

Cascadia Colonization Authority SB-11 Support Robot

Designed to assist CCA crews on long range exploration missions. With its wide task software range, the SB-11 is a useful crew member to ships engaged in that duty.

Cost = 132,925Cr

STR	DEX	INT	EDU	SOC
8	11	8	6	4

Hit Points 11/23

Rounded (Cylindrical) Chassis TL 10

Overall Weight = 64.35kg

Armor = Mesh

Head = All sensors, Vocoder & Comms and OLED

Batteries with charge port (60-minute recharge)

Duration = 21 hours

Arms = Standard (small) 2x with grippers

Locomotion = Anti-Grav Node TL 10 (200kph)

Low Autonomous Core, Full Command

Core/6 Module 6x

Synaptic Storage TL 10 2x (6)

Advanced Storage 20x (40)

Emotion Emulator

Personality Pattern type 3

Flyer (Grav)/1

Admin/1

Janitor/1

Medic/1

Pilot/1

Steward/1

Advanced Optical 2x

Micro Optical 2x

Standard audio 2x

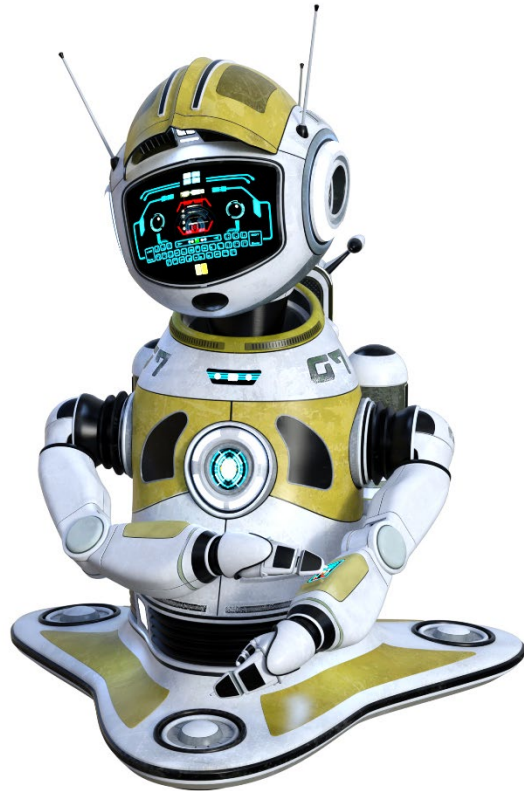
Vocoder

OLED (head)

Spotlight Small

Storage Compartment 2kg

Radio Class I (Distant 5km)



Avatar Biosynth Type 2

This is the standard type 2 biosynth designed for use by a type 3 ship's Avatar. Still uncommon even in the central systems and fully functional in every way, Avatar AI Core biosynth robots allow the ship to interact with the world inside and outside the ship in a way never possible before. The ship becomes part of the crew and because biosynths are very difficult to tell apart from biological humans, who would know without careful observation.

Cost = 852,575Cr

STR	DEX	INT	EDU	SOC
8	11	14	17	10

Hit Points 14/28

Biosynth Chassis (Male) TL 13

Overall Weight = 90.3kg

Armor = Jack

Head = All sensors

Batteries with charge port and wireless charge
(75-minute recharge)

Duration = 53 hours

Arms = Standard (small) 2x

Locomotion = Legs 2x (10kph)

Avatar AI Core, Full Command

Core/8 Module 5x

Synaptic Storage TL 12 35x (140) +4 Edu

Astrogation/2

Pilot/2

Advocate/1

Broker/1

Electronics (Computers)/1

Flyer (Grav)/1

Gun Combat (Slug Pistol)/1

Persuade/1

Vacc Suit/1

Mechanic/0

Optical (Biosynth Eye) 2x

Audio (Standard) 2x

Olfactory (Standard)

Taste Sensor (standard)

Touch (Full Coverage)

Vocoder (Biosynth)

Personal Comm

Auto Repair

Bio-organic Processor

Breathing Emulator

Sexual Organs - Male (Haptic)



KAY9 Security and Guard Robot

Cost = 89,996.5Cr

STR	DEX	INT	EDU	SOC
4	9	6	8	2

Hit Points 21/37

Contoured Basic (Canine)
Chassis TL 13
Overall Weight = 180.78kg
Armor = Mesh
Sealed System
Reinforced (40%) &
Strengthened (20%) Frame
Head = Sensors, Holo-equipment
and Speaker
Facial Expression Capability

Fuel Cell 40 Power
Duration = 30 Days

Arms = None
Locomotion = Legs x4 (70kph)

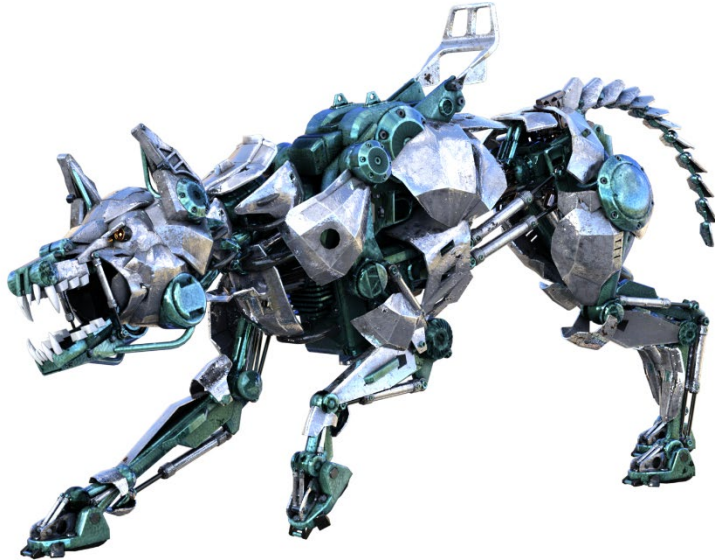
Integrated Mount Stunner
Integrated Mount Laser Pistol
Retracting Claws (each paw)
Teeth

High Data Core, Basic Command
Core/8 Module 2x
Advanced Storage 32 (64)
Emotion Emulator

Athletics/1
Gun Combat (Energy Pistol)/1
Melee (Natural Weapons)/1
Recon/1
Stealth/1
Tactics (military)/1

Advanced Optical Sensor Package
Comm (personal)
Dataport
ECM
Electromagnetic Sensor
Microwave Link
Radar

Auto Repair
Holoprojector and Recorder TL 9
Smoke Discharger
Spotlight Small



SW11 Malingee Warbot

The SW-11 support warbot has been in active service with the New Perth Army for eight years. With a powerful anti-gravity locomotion system and an operational duration of 18 days the SW11 provides comprehensive squad level fire support for the New Perth Army. A variant of the design armed with twin laser rifles and a larger fuel cell is being trialled for use by the New Perth Navy.

Cost = 188,475Cr

STR	DEX	INT	EDU	SOC
15	13	8	8	3

Hit Points 60/124

Spherical (Sphere) Chassis TL 11

Overall Weight = 394kg

Armour = Cloth

Reinforced Chassis = 4 points

Hardened and Sealed System

Spherical Chassis Head = All sensors & Vocoder

Fuel Cell 50 Power

Duration = 18 Days

Arms = Standard (Heavy) 2x,

Locomotion = Anti-Grav A (200kph)

Medium Machinegun (Arm Mount External)
2x

RAM Grenade Launcher (Chassis Integrated)
1x

Low Autonomous Core, Full Command

Core/6 Module 6x

Synaptic Storage TL 10 5x (15)

Advanced Storage 10x (20)

Heavy Weapons (Vehicle Mounted)/2

Ground Combat (Infantry)/1

Flyer (Grav)/1

Recon/1

Zero-G/1

Advanced Optical 2x

Optical Zoom 2x

Advanced Audio 2x

Polarising Shield 2x

Vocoder

Personal Comm

Radio Class III (Regional 500km)

500 Round Machine Gun Magazine 2x

24 Round RAM Grenade Magazine



TL 10 Cargo Handler Robot

Found at nearly every cargo handling facility throughout Clement Sector, cargo handler robots are not particular bright but understand their job. Any orders to them must be carefully expressed to ensure they do not get confused. More expensive and modern models are more intelligent and can learn on the job but for most cargo handling facilities, these models are just fine.

Cost = 23,450Cr

STR	DEX	INT	EDU	SOC
36	3	4	5	1

Hit Points 63/125

Angular (Rectangular) Chassis TL 10
Overall Weight = 384kg
Armour = Mesh

Fuel Cell 75 Power
Duration = 30 Days

Arms = Standard (heavy)
Locomotion = Tracks (5kph)

High Data Core, Limited Command
Core/5 Module 3x
Advanced Storage 5x (10)

Drive (tracked)/1
Cargo Handling/1

Encompassing Standard Optical
Standard audio x2
Vocoder

Spotlights Small 4x



ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

OPEN GAME LICENSE Version 1.0a

The following text is the property of Wizards of the Coast, Inc. and is Copyright 2000 Wizards of the Coast, Inc ("Wizards"). All Rights Reserved.

1. Definitions: (a) "Contributors" means the copyright and/or trademark owners who have contributed Open Game Content; (b) "Derivative Material" means copyrighted material including derivative works and translations (including into other computer languages), potation, modification, correction, addition, extension, upgrade, improvement, compilation, abridgment or other form in which an existing work may be recast, transformed or adapted; (c) "Distribute" means to reproduce, license, rent, lease, sell, broadcast, publicly display, transmit or otherwise distribute; (d) "Open Game Content" means the game mechanic and includes the methods, procedures, processes and routines to the extent such content does not embody the Product Identity and is an enhancement over the prior art and any additional content clearly identified as Open Game Content by the Contributor, and means any work covered by this License, including translations and derivative works under copyright law, but specifically excludes Product Identity. (e) "Product Identity" means product and product line names, logos and identifying marks including trade dress; artifacts; creatures characters; stories, storylines, plots, thematic elements, dialogue, incidents, language, artwork, symbols, designs, depictions, likenesses, formats, poses, concepts, themes and graphic, photographic and other visual or audio representations; names and descriptions of characters, spells, enchantments, personalities, teams, personas, likenesses and special abilities; places, locations, environments, creatures, equipment, magical or supernatural abilities or effects, logos, symbols, or graphic designs; and any other trademark or registered trademark clearly identified as Product identity by the owner of the Product Identity, and which specifically excludes the Open Game Content; (f) "Trademark" means the logos, names, mark, sign, motto, designs that are used by a Contributor to identify itself or its products or the associated products contributed to the Open Game License by the Contributor (g) "Use", "Used" or "Using" means to use, Distribute, copy, edit, format, modify, translate and otherwise create Derivative Material of Open Game Content. (h) "You" or "Your" means the licensee in terms of this agreement.

2. The License: This License applies to any Open Game Content that contains a notice indicating that the Open Game Content may only be Used under and in terms of this License. You must affix such a notice to any Open Game Content that you Use. No terms may be added to or subtracted from this License except as described by the License itself. No other terms or conditions may be applied to any Open Game Content distributed using this License.

3. Offer and Acceptance: By Using the Open Game Content You indicate Your acceptance of the terms of this License.

4. Grant and Consideration: In consideration for agreeing to use this License, the Contributors grant You a perpetual, worldwide, royalty-free, non-exclusive license with the exact terms of this License to Use, the Open Game Content.

5. Representation of Authority to Contribute: If You are contributing original material as Open Game Content, You represent that Your Contributions are Your original creation and/or You have sufficient rights to grant the rights conveyed by this License.

6. Notice of License Copyright: You must update the COPYRIGHT NOTICE portion of this License to include the exact text of the COPYRIGHT NOTICE of any Open Game Content You are copying, modifying or distributing, and You must add the title, the copyright date, and the copyright holder's name to the COPYRIGHT NOTICE of any original Open Game Content you Distribute.

7. Use of Product Identity: You agree not to Use any Product Identity, including as an indication as to compatibility, except as expressly licensed in another, independent Agreement with the owner of each element of that Product Identity. You agree not to indicate compatibility or co-adaptability with any Trademark or Registered Trademark in conjunction with a work containing Open Game Content except as expressly licensed in another, independent Agreement with the owner of such Trademark or Registered Trademark. The use of any Product Identity in Open Game Content does not constitute a challenge to the ownership of that Product Identity. The owner of any Product Identity used in Open Game Content shall retain all rights, title and interest in and to that Product Identity.

8. Identification: If you distribute Open Game Content You must clearly indicate which portions of the work that you are distributing are Open Game Content.

9. Updating the License: Wizards or its designated Agents may publish updated versions of this License. You may use any authorized version of this License to copy, modify and distribute any Open Game Content originally distributed under any version of this License.

10 Copy of this License: You MUST include a copy of this License with every copy of the Open Game Content You Distribute.

11. Use of Contributor Credits: You may not market or advertise the Open Game Content using the name of any Contributor unless You have written permission from the Contributor to do so.

12 Inability to Comply: If it is impossible for You to comply with any of the terms of this License with respect to some or all of the Open Game Content due to statute, judicial order, or governmental regulation then You may not Use any Open Game Material so affected.

13 Termination: This License will terminate automatically if You fail to comply with all terms herein and fail to cure such breach within 30 days of becoming aware of the breach. All sublicenses shall survive the termination of this License.

14 Reformation: If any provision of this License is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable.

15 COPYRIGHT NOTICE

Open Game License v 1.0a Copyright 2000, Wizards of the Coast, Inc.

High Guard System Reference Document Copyright © 2008, Mongoose Publishing.

ARTIFICIAL: ROBOTS IN CLEMENT SECTOR

Mercenary System Reference Document Copyright © 2008, Mongoose Publishing.

Modern System Reference Document Copyright 2002-2004, Wizards of the Coast, Inc.; Authors Bill Slavicsek, Jeff Grubb, Rich Redman, Charles Ryan, Eric Cagle, David Noonan, Stan!, Christopher Perkins, Rodney Thompson, and JD Wiker, based on material by Jonathan Tweet, Monte Cook, Skip Williams, Richard Baker, Peter Adkison, Bruce R. Cordell, John Tynes, Andy Collins, and JD Wiker.

Swords & Wizardry Core Rules, Copyright 2008, Matthew J. Finch

System Reference Document, Copyright 2000, Wizards of the Coast, Inc.; Authors Jonathan Tweet, Monte Cook, Skip Williams, based on original material by E. Gary Gygax and Dave Arneson.

System Reference Document Copyright 2000-2003, Wizards of the Coast, Inc.; Authors Jonathan Tweet, Monte Cook, Skip Williams, Rich Baker, Andy Collins, David Noonan, Rich Redman, Bruce R. Cordell, John D. Rateliff, Thomas Reid, James Wyatt, based on original material by E. Gary Gygax and Dave Arneson.

T20 - The Traveller's Handbook Copyright 2002, Quiklink Interactive, Inc. Traveller is a trademark of Far Future Enterprises and is used under license.

Traveller System Reference Document Copyright © 2008, Mongoose Publishing. Traveller is © 2008 Mongoose Publishing. Traveller and related logos, character, names, and distinctive likenesses thereof are trademarks of Far Future Enterprises unless otherwise noted. All Rights Reserved. Mongoose Publishing Ltd Authorized User.

Cepheus Engine System Reference Document, Copyright © 2016 Samardan Press; Author Jason "Flynn" Kemp

The Clement Sector Copyright 2013, Gypsy Knights Games LLC Author John Watts

Clement Sector: The Rules, Copyright 2016, Gypsy Knights Games LLC Authors John Watts, Michael Johnson, and Jason Kemp

Clement Sector Core Setting Book 2.0, Copyright 2015, Gypsy Knights Games LLC Author John Watts

The Anderson and Felix Guide to Naval Architecture 2.0, Copyright 2015, Gypsy Knights Games LLC, Author Michael Johnson

The Anderson and Felix Optional Components Guide, Copyright 2018, Gypsy Knights Games LLC, Author Michael Johnson

Subsector Sourcebook 1: Cascadia 2.0, Copyright 2015, Gypsy Knights Games LLC, Author John Watts

Subsector Sourcebook 5: The Colonies 2.0, Copyright 2016, Gypsy Knights Games LLC Author John Watts

Tree of Life: Altrants in Clement Sector, Copyright 2017, Gypsy Knights Games LLC Author John Watts

Wendy's Guide to the Fleets of Cascadia Subsector Copyright 2017, Gypsy Knights Games LLC, Author Michael Johnson

Unmerciful Frontier: The CCA Sourcebook, Copyright 2018, Gypsy Knights Games LLC, Author John Watts

Artificial: Robots in Clement Sector, Copyright 2018, Gypsy Knights Games LLC, Author Michael Johnson

16. Product Identity: The following items are hereby identified as Product Identity, as defined in the Open Game License version 1.0a, Section 1e and are not open content: All trademarks or registered trademarks, proper names (characters, organizations, etc.), dialogue, plots, storylines, locations, characters, artwork and trade dress. (Elements that have previously been designated as Open Game Content or are in the public domain are not included in this declaration.) Open Content: Except for material designated as product identity (see above) any game mechanics are Open Game Content as defined in the Open Gaming License version 1.0a section 1(d). No portion of this work other than the material designated as Open Game Content may be reproduced in any form without written permission.

This includes but is not limited to all subsector names, world maps, world names, system names, system maps, vehicle names, starship names, starship classes, artistic depictions of ships and vehicles, and organizations.